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Europe's Needs

E. R. Henson

UNRRA Agriculture Rehabilitation Director

EUROPE needs a million and a half tons of cereal grains a month as a minimum for preventing mass starvation, said E. R. Henson, Director of Agricultural Rehabilitation for the United Nations Relief and Rehabilitation Administration in speaking at the Institute of Food and Agriculture held under the auspices of the Council on World Affairs in Cleveland, Ohio, Saturday, April 13, 1946, at Hotel Cleveland.

Mr. Henson described conditions in the UNRRA countries, "where we have observers to see that distribution is made without discrimination."

"The UNRRA grain ration in Italy is now down to a point where the majority of the population are below the subsistence level. An additional cut has been temporarily staved off, but unless some grain can be found immediately the ration will have to be reduced still further," Mr. Henson said.

"The present ration amounts to 4 slices of bread and a few pieces of spaghetti. Europe's prayer for daily bread is not for something to serve *with* a meal. It is the major portion of the meal, often the meal itself. If the UNRRA grain boat fails to arrive there is nothing to substitute in place of the grain that didn't show up at the dock.

"Hunger kills in two ways. So far in Europe we have had no mass starvation among the adult population, but we can not escape it longer if we fail to fill the holds of our boats. Prolonged hunger on the so-called subsistence diet can so weaken men, women and children that they become easy prey to disease."

Mr. Henson said that a recent survey indicated that tuberculosis among children is ten times greater than in America. Medical care, hospitals, clinics are needed throughout the continent to fight that and other diseases of malnutrition, but without food

the war against disease cannot be won.

"Industrial equipment essential for immediate relief is needed to get railroads, textile mills and coal mines operating again, but here again food is the unlocking key. Regardless of equipment industrial workers can't produce on a starvation diet. It takes calories to mine coal," Mr. Henson added.

Mr. Henson believes that the food needs will continue well into next season, for the European farmers have not yet begun to get their crops in properly.

Europe must have more draft power, more fertilizer, more agricultural supplies of nearly every category before she can feed herself.

He praised the spirit of the people which took them into the fields to pull their plows but said it would take more than will power to break Europe's starvation cycle.

"We have our requisition in now for 21,508 tractors. One tractor can produce enough food for 1,000 people. We have several thousand in operation this spring. They are operated in teams under government supervision. We're concentrating them in the most fertile areas. They go from one community to another preparing the individual holdings in turn. They're rigged with lights and the people operate them in shifts. We're getting the maximum use out of those we have. Every one landed before June can plough 800 acres this season. Those that come later can plant 400 to 600 acres. Those that arrive in the fall can be used to get in winter wheat."

Wilting Grass for Silage

Condensed from The Jersey Bulletin

J. M. Shepherd

U. S. Dept. of Agriculture

DURING the past several years, thousands of farmers have made silage from legumes and immature grass crops by using the wilting method as an alternative to the use of scarce or high priced preservatives. They have found the wilting method easy to use and the silage easy on their silos. Farmers who have followed closely the simple and practical requirements of this method have obtained an excellent grade of silage—free from mold and about the most palatable and nutritious silage they have ever put up. On the other hand, failure of some farmers to follow closely these simple requirements has in some instances resulted in more or less moldy silage and a condemnation of the wilting method.

At the Agricultural Research Center at Beltsville, Md., the Bureau of Dairy Industry has made from 100 to 200 tons of grass silage by the wilting method nearly every year for the past 10 years. Most of it has been of excellent quality—free from mold, and equal in feeding value to unwilted silage put up with molasses or other preservatives, although a little lower in carotene content. In a few cases there has been a small amount of mold in the silage in the upper part of the silo, less than 1 per cent by weight of the total. This is less than is often found in the corn silage.

Silage made by the wilting method, principally alfalfa, has consistently given good results when fed to milking cows at Beltsville. Milk production and live-weight gains have been equal to or better than when hays from the same cutting or from the same kind of crop were fed. Despite a considerable loss of carotene due to wilting the crop before ensiling, this silage as fed contained two to three times as much carotene as is usually found in hay as fed. When the alfalfa silage was fed along with a limited amount of corn silage and the usual grain ration, the butterfat which the cows produced was much higher in vitamin A and natural yellow color than the butterfat produced by the same cows on the usual winter ration of hay and grain; or hay, corn silage, and grain. It was more nearly like that produced on the same cows the pre-

Reprinted by permission from Jersey Bulletin, Indianapolis, Indiana, March 10, 1946

vious summer on good pasture.

As a result of its experience, the Bureau of Dairy Industry now uses the wilting method of making grass silage at Beltsville and recommends the following procedure as one that will consistently give good results under practical farm conditions if it is followed closely.

1. *Silos should be airtight and have smooth walls.* The first requirement for making good wilted silage, or any other kind of silage for that matter, is an airtight silo. Air must be forced out of the silage and kept out, otherwise considerable moldy silage will result. If the silo walls are very rough, pockets of air along the walls will cause a thin layer of moldy silage to develop next to the wall for a considerable distance down in the silo. If for any reason the walls or doors of an upright silo leak air, moldy silage will form. If the silo is in need of repair, these repairs should be made well in advance of silo-filling time. The steel hoops on wooden stave silos should be tightened before silo filling starts. In using shallow trench silos, extra care should be taken to pack the silage solidly and tight against the walls.

2. *Wilt the crop slightly.* To make good silage, legumes and immature grasses should be wilted only slightly after they are cut. When they are put in the silo the average moisture content should not be higher than 68 per cent nor lower than 60 per cent. Scattered loads can have as much as 70 per cent moisture without producing undesirable fermentations and odors, or they can have as little as 55 per cent moisture if such loads are not too close to the top of the silo. If the crop is so dry that it causes considerable dust when chopped and blown into the silo, it probably has less than 55 per cent of moisture. If a trench silo is used, none of the crop should contain less than 60 per cent moisture.

The time required to wilt the crop to the desired moisture level (60 to 68 per cent) may be as little as 1 or 2 hours on good drying days, unless the crop is very heavy or very immature. During prolonged dry spells, crops cut at the usual haying stage will be dry enough to ensile within a few minutes after cutting. On very humid days, a half day to a day may be required to wilt to crop sufficiently. During rainy spells, the mowed crop may be in the field 2 or 3 days before it is dry enough to be siloed.

With a little practice the farmer can learn to determine by observation when the crop is ready for siloing. When a crop has wilted slightly it will appear a little lighter in color and the leaves and stems will be limp but not dry or curled. Twisting will bring moisture to the surface of the stems

but no free moisture will run off. Upon rubbing the chopped crop material between the hands, the bruised stems and leaves will feel cool and moist but not wet. At this point the forage should be siloed as rapidly as possible so that no portion of the crop will become excessively wilted.

The farmer can also determine quickly when the chopped material contains a suitable amount of moisture for making wilted silage by using a simple inexpensive moisture tester developed at Beltsville. This moisture tester is described and illustrated in U. S. D. A. Leaflet 238, Making Grass Silage by the Wilting Method.

If desired, the rain-wet portion of the crop can be siloed without wilting or filling the silo slowly at the rate of 3 to 4 feet a day, without tramping, so that some heat will be generated; or it can be siloed at a normal rate by running 10 to 20 per cent of dry hay or 5 to 12 per cent of ground dry grain or 3 to 5 per cent molasses (by weight) through the cutter along with the wet crop.

To avoid wilting some of the crop too much, it is usually advisable to cut no more at one time than can be ensiled in half a day. To avoid too rapid wilting, use a wind-rowing attachment on the mower cutter bar or follow close behind the mower with a side delivery rake. If the crop is not too heavy, combine two mowed swaths into one windrow to speed up the loading and filling operations.

If some of the crop gets so dry that it is dusty when chopped and blown into the silo, fresh unwilted green forage should be run through the cutter along with the dry material. Both dry and fresh green forage can be hauled in on the same load if field conditions permit.

3. *Set the cutter for a ¼ inch cut for best results.* Chopping the crop fine causes it to pack quickly and more completely in the silo—thereby forcing out air which is the cause of mold. This is a requirement that MUST be followed in making silage by the wilting method. Under no circumstances should the cutter be set for a longer cut than ⅓ inch, and the shorter setting of ¼ inch is preferable and will give still better results. Failure to use a fine cut will prevent close packing, considerable air will be trapped in the silage, and the silage will most certainly contain considerable mold. Other advantages to be gained from the fine chopping are: less fermentation, a better type of fermentation, a more palatable silage, and an increase in the quantity of crop that can be put in the silo. During silo filling, the cutter knives should be changed just as soon as they fail to cut cleanly and begin to shred the

material. The cutter bar against which the knives operate should be changed or turned before its edge becomes rounded enough to cause shredding rather than cutting.

4. *Distribute silage evenly and tramp thoroughly in top third of silo.* All of the material put in the top third of the silo should be wilted only slightly. Heavy moist material will pack closer and also press out more air. Proper distribution of the material and thorough tramping in the upper half or one-third of the silo not only helps force out the air but it also permits putting in more of the crop — thereby producing greater natural pressure for forcing out the air in the lower part of the silo.

5. *Put 4 to 6 feet of heavy unwilted silage on top of the wilted silage.* This wet unwilted top layer should also be chopped fine. It will complete the job of forcing the air out of the ensiled material and will keep the air out. The more the crop has wilted before it was ensiled or the longer the silage is to be stored before it is fed, the deeper this heavy top layer should be. Failure to put enough fresh unwilted silage on top, particularly if some of the wilted silage near the top is very dry, will result in extensive areas of small moldy spots several feet down in the wilted portion. *No preservative whatsoever* will be needed in this wet top layer since it warms up naturally, producing a desirable fermentation and a mild palatable silage without preservatives.

6. *Level off top and keep well tramped near wall while the silage is settling.* When filling is completed, level off the top and leave the silage slightly higher near the wall than at the center. During the settling period, keep the silage well compacted over the top and packed tightly against the silo wall. This will result in a minimum amount of top spoilage and will pay well for the time spent. Failure to tramp and pack the top properly during this period will result in air getting into the silage, particularly near the wall, and may cause several times as much spoilage as would occur otherwise. It may also result in some moldy silage in the wilted portion.

Good wilted grass silage is a fine feed. It produces more and better feed per acre than hay, particularly from weedy first-cutting crops, at no higher labor and equipment requirements per ton of dry matter stored. If the crop is not too mature when cut, the silage will be high in carotene content. By performing properly every operation needed to insure good quality feed, the results will be more than satisfactory and well worth the effort.

Markets Overseas — Are They Important?

Condensed from Successful Farming

O. B. Jesness
University of Minnesota

Are foreign markets still important for American farmers? Can the United States export farm products? What are the prospects, good and bad, for the years ahead? What part will trade play in international cooperation to maintain peace? Is there any conflict between our domestic programs and international cooperation? These are the sort of questions every American farmer and all other citizens as well ought to ask and try to answer.

First, let us take a look at the place of exports in the agricultural picture. For 10 years or more after the last war, one out of every six of America's crop acres was kept at work producing for export. The depression of the 1930's with its decided swing to economic nationalism, the world over, cut into trade decidedly. Even so, the foreign market in the years before this war was important. It bought about two-fifths of our cotton, one-third of our tobacco, and sizable amounts of wheat, lard, fruits, and rice. War boomed exports in some food products while it cut others. Lend-Lease purchases became an important part of the farm market. Now U.N.R.R.A. has stepped into the breach temporarily. But trade after the next year or so again will be dependent upon more-usual buying and selling operations.

The Department of Agriculture has made some studies of what the situation may be like in 1950 under different conditions. One of these studies estimates that, if we have "full" employment, our national income may total about 150 billion dollars (at 1943 prices) and our agricultural exports may add up to 1.2 billion dollars.

Some of the amounts going into the 1.2 billion-dollar total are 600 million pounds of lard; 75 to 100 million bushels of wheat; 4½ million bales of cotton; 440 million pounds of tobacco; and nearly 4 billion pounds of fruits. Even with the lively home market likely if conditions come up to that level, and with these exports, farm supplies are likely to be on the surplus side.

The *loss* of the export market would lead to serious surplus

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problems. If the domestic market is less lively than shown, the farm situation could easily go sour. *Clearly, farmers cannot afford to do without their foreign markets.* Instead, they have a vital interest in seeing them enlarged.

Some want to dismiss foreign markets by saying they make up so small a share of the total that it is insignificant. Interestingly, some of the same individuals can get quite excited over imports, even though they, likewise, are only a small part of the total supply. Over-all figures are misleading. We cannot dismiss 40 per cent of the cotton market, 30 per cent of the tobacco market, or even 10 per cent of the wheat market so easily.

But why should this bother farmers who produce for the home market? The answer is easy to find. Lose the market for 4 or 5 million bales of cotton and a lot of cotton growers will be looking for something else to do. Some of them will turn to livestock. And if the big corn-producing states have to cut hog production because lard exports are out, they may expand dairying. All farmers and all kinds of farmers, therefore, have a stake in holding and expanding exports.

Nor is their stake only in agricultural products. Farmers stand to gain if exports increase employment and pay rolls in nonfarm lines in which we produce for profit. Exports of automobiles, farm machinery, and the products of other efficient industries will help the farmers indirectly.

But how are we to get and hold those markets? One answer is that a high level of activity the world over will stimulate trade, so anything which promotes sound, productive activity will help. Willingness of nations to trade and to work together is important. People need to remember that trade, both domestic and foreign, is an exchange of goods and services. This means that exports and imports are tied up together.

Imports are our payment for exports and our exports pay for our imports. Too often, we think of imports as undesirable competition and therefore as something to be restricted. We want to export but to hold down imports. *That is, we object to accepting payment for our sales!* When we cut imports, we reduce our exports. We also need to see imports as means of satisfying wants. The war has made clear that the United States is a "have not" nation in the case of some essential goods. It did not take us long to discover how important tin, rubber, jute, coffee, and tea are to us. These are only samples.

But the cry will go up that "We must protect the American standard of living against the low

standards in some other parts of the world." Everyone realizes that there are decided differences in incomes and levels of living within the borders of our own country. *Should we have trade barriers to protect the Cornbelt in trading with the Cotton South because incomes of sharecroppers are lower than those of Cornbelt farmers?* Of course not, yet that's the sort of setup we have sometimes promoted in *world* trade!

Import barriers do not raise our levels of living. By and large, they add to the costs of some in order to subsidize others. While the effects on any selected part of the population cannot be measured exactly, farmers as a whole probably pay out more in higher prices and in loss of foreign markets on account of the tariff than they get in the form of higher prices through protection.

Exports are pointed to as necessary for keeping a high level of employment at home. This is correct as far as it goes but it is only part of the story. A high level of business activity also will help exports because it means a good demand for imports, which will improve our chances to *sell* abroad. So a high level of business here at home is one of the best aids to a satisfactory foreign trade. A high level of employment and activity in other countries will help international trade in the same way. We should think of activity and trade on a world basis, not merely in terms of the United States.

Another slogan which has won some popularity proclaims that "We should buy from those who buy from us." Such a program would foster bilateral (between one nation and another one) trading and lead us to try to balance our trade, country by country. How would that fit our needs? While our purchases and sales are spread the world over, such products as coffee, rubber, nonferrous metals, tea, and the like bulk large among our imports. Many of our imports come from areas in the Pacific and Latin America; a considerable share of our exports move to Europe. Bilateral trading does not fit our situation; multilateral (between many different nations) trading does. It, therefore, makes sense for us to throw our influence on the side of developing conditions more favorable to many-sided trading the world over. Special trading arrangements and preferences of other countries which foster bilateral trading, or the development of trading blocks, interfere with the growth and development of our trade. *What is more, they may endanger the future peace of the world.*

But what can the United States do about it? The answer is that we probably can do more

than we realize. We are today the world's leading nation. How we employ that leadership is very important in deciding the future of the world. Will we take the lead in developing effective world cooperation, or will we pick up our marbles and go home to play by ourselves?

We are interested in winning back economic order and balance the world over. While making sure that the war fangs and claws of Germany and Japan are not restored, our self-interest calls for the return of these and other nations to active, peacetime holes in the world economy. We want them to build up governments and activities with which we can live and cooperate. We can ill afford to try to reduce them to economic slavery.

The reciprocal-trade-agreements program brought a realistic reversal in our trade policy. It is a step in the direction of undoing some of the damage caused by the wave of nationalism which engulfed the world in the period between the wars. This country will do well to use this program as much as possible. The U. N. O. and its program are the machinery for world cooperation in this and other fields.

The Breton Woods Agreement with its Fund and Bank of Reconstruction bear promise of becoming important aids to sound trade. Plans also are underway for an international conference to consider an extensive cutting back and making over of trade barriers.

War throws things out of balance. It consequently, tends to breed nationalism. This country needs to be on guard against this aftermath of war right now. We are absorbed with problems of reconversion. We have difficulties between labor and management. Many chafe under war controls and want them chucked out of the window, apparently oblivious to the violent inflation which could result, to be followed in due course by disastrous deflation. Labor wants reduction in overtime to be made up by higher wage rates and also wants more pay because living costs have risen, not always admitting in full that wages are part of those costs. Farmers would like to keep on receiving wartime incomes, and some want continued government price supports based on revised parity.

Americans rather generally, including those in positions of leadership, do not seem to realize that the way we face and settle these issues may have an important bearing on the future of the world and our part in it. Here is an illustration of this point: If we peg prices and wage rates at unusually high levels, we may expect to have to defend them against the outside world. One of

the defenses we are likely to use is higher trade barriers. These will reduce our imports which, in turn, will shrink our markets.

The rest of the world will reduce their purchases from us, both because our prices are out of line, and because they cannot buy from us if they cannot also sell to us. Two-price systems under which we will export at world prices while keeping those at home at higher levels will not solve this difficulty. For one thing, this is a form of dumping against which other countries will apply restrictions, just as we do when they try to dump products here. For another, such a scheme will demand still higher protection to keep products out. In short, it moves away from world cooperation. If the United States, the richest and most powerful nation, turns its back on the world and goes in for economic nationalism, what can we expect from other nations? A good many probably will head for the nearest storm cellar. Nationalism again may spawn another war.

Peace depends on real cooperation among nations: not merely fine phrases at international conferences and in official documents, but in day-to-day living. We must have faith in international organization, but faith without works to give it life is dead. The nations must live and work together. A reasonable amount of international trade is part of that living together. If international cooperation fails, is there any real hope of escaping another war? Keeping the peace is vital. Let us keep in mind the part which trade may play in keeping that peace.

Farm Applications of Bactericidal Lamps

Condensed from Agricultural Engineering

L. P. Veloz

Bactericidal Lamp Specialist, Westinghouse Electric & Mfg. Co.

SPECIAL forms of ultraviolet lamps developed for the medical profession for the purpose of combating air-borne infection are continually finding new farm applications, and it appears that farmers will become large users of these lamps.

Bactericidal lamps made in various lengths are a slender cold-cathode lamp about the diameter of one's forefinger. Through the use of a low-pressure mercury vapor arc within a very special glass, a lamp has been developed that transmits a large portion of its energy in the bactericidal ultraviolet band. These lamps operate on alternating electric current only, and the 30-in lamp consumes approximately 16 w. Since they have no filaments to burn out, the life expectancy of these lamps is 5,000 to 6,000 hours. Bactericidal lamps are not to be confused with other available ultraviolet sources, such as the sunlamp, which have little or no bactericidal value, or the high pressure quartz lamp the output of which is over the entire range of the ultraviolet and visible spectrum.

Perhaps the most important agricultural application at this time is one in the poultry industry, important because of the tremendous losses poultrymen incur every year as the result of mortality due to diseases. Dr. T. C. Byerly, senior poultry husbandman, U. S. Department of Agriculture, before a poultry industry conference on July 26, stated that the industry loses 150 million dollars a year due to the ravages of disease, and that this represents a cost of two cents on every dozen eggs produced and two cents on every pound of poultry produced. In all phases or stages of this business, that is, in the hatching, brooding, raising and egg laying, there is one common problem involved which is not overcome by good housekeeping or sanitary techniques, and that is the problem of preventing or reducing air-

This paper was presented at a meeting of the North Atlantic Section of the American Society of Agricultural Engineers at New York.

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borne cross-infection, between the chicks or flock, so largely responsible for the epidemic spread of disease in poultry houses.

When properly installed in the hatching compartment and the room in which the incubator is located, bactericidal lamps reduce to a minimum the possibility of cross-contamination between the hatching chicks due to the rapidly circulating air within the hatching compartments. The use of these lamps is recommended in the incubator room because, in the great majority of the cases, contaminated air from the hatching compartments is exhausted into this room which serves as a fresh air supply for the incubator. An equally important reason is that this highly contaminated air can act as a source of infection for the rest of the plant. It is further recommended that the lamps be used in the sexing, shipping, and sorting rooms for the complete protection of the chicks against air-borne infection until they are shipped. Hatchery men, who have used the lamps for the past year or two, tell us that the protection afforded by these lamps has materially increased the viability of their chicks; and this has not only built up good will for them but resulted in considerable savings.

Government bureaus tell us 60 per cent of all chick mortality is within the first 16 days. This then applies to the nursing or brooding stage which in many plants is combined with the raising to broiler size. Whether raised on the floor or in batteries, the acute congestion during the first two to four weeks of a chicken's life offers an ideal opportunity for the rapid spread of air-borne disease. The germ killing rays of the bactericidal lamps continually disinfect the air, offering the utmost in protection against the spread of air-borne epidemics.

A secondary benefit, perhaps as important as the reduction of mortality, is the added vigor and gain in weight the birds acquire. They feather out faster, and the plumage is better; the combs are deep red and erect; the pigmentation of the legs appears sooner and is more noticeable. Part of these benefits is undoubtedly due to the small amount of vitamin D producing energy with which they are continually being irradiated. The bactericidal lamps produce as a by-product a very small percentage of their output in the vitamin D part of the ultraviolet spectrum.

Large operators, who have run controlled tests, tell us that the use of these lamps has reduced mortality in their flocks 50 to 70 per cent. They have been able to put their birds on the market up to two weeks sooner and they have fewer runts and culls. One of the largest operators in the Middle West writes: "In a control

test of two identical houses we found approximately 68 per cent lower mortality in the house using bactericidal lamps . . . the number of culls and runts in the final birds was 50 per cent less . . . we raised 1,000 pullets per battery, instead of 750 where these lamps were not used . . . pigmentation of combs and legs was noticeably better . . . no mold whatever developed in watering pans exposed to the lamps. . . . "

Conditions found in egg laying houses are very similar with this exception: mortality at this stage can very seriously affect the farm income not only because the laying bird is worth more, but the loss of revenue from its egg production can run into a great deal of money. Here too, bactericidal lamps offer the utmost in protection against the spread of air-borne epidemics and in addition exert a beneficial effect on egg production.

Tests conducted in egg laying houses have shown a tendency to level out the peak and valley of the egg laying season with total gains as high as 10 to 15 per cent, the interesting point being the greatest gain in egg production came about the time when eggs were at the highest market price.

The development of this application came so fast that there was not time for accredited institutions to make the tests that would have normally preceded any widespread acceptance of these lamps in the poultry industry. Much of this work has now been started by various institutions and undoubtedly more will be done in the future. However, the practical results obtained in the field by the poultrymen speak for themselves, for the thousand and more installations that have been made in the past two years have been without solicitation and promotion.

In the dairy industry there are several excellent applications for it is a business where sanitation pays off. Starting in the maternity and cow barns, by materially reducing the bacteria and virus in the air, bactericidal lamps minimize the chance of respiratory cross-infection and in this way promote more healthful conditions in the barn.

Just as important is the control of air-borne bacteria in the milking room. It is here that organisms settling out of the air come in contact with the milk and milk pails forming a large part of the initial contamination; a few ceiling-mounted lamps are all that are needed in most cases to relieve this condition.

Pretty much the same condition holds true in the utensil storage rooms. Here equipment and utensils after being washed and sterilized are stored till the next milking time. One bactericidal lamp in the average small room will

permit virtual sterile storage of the milking equipment. Another popular use in this room is to take two of the standard fixtures and by bolting them back to back you have a practical, efficient and portable milk can sterilizer. Inserting the lamp unit in the milk can for a few minutes does the job.

In milk processing plants, as an aid to bacteria control, they should be used in the pasteurizing room and over the bottle conveyor. Where butter churning is done, this area should be included. A great deal of research has been done and is now being done on pasteurizing milk with ultraviolet rays but to date no practical solution to our knowledge has been developed. Ultraviolet radiations have extremely limited penetration through material as opaque as milk. The intensity required to sterilize it is sufficient to cause deterioration of the fats and proteins thus producing an off taste.

There are many out-of-the-ordinary applications in almost all industries, such as in the milk processing plant in Gustine, California, where due to a secret pasteurizing process they say their cream after bottling can be held at room temperature for more than a year, bactericidal lamps being widely used in aiding and maintaining an aseptic condition.

In cheese making, which is dependent on one particular organism for a specific result, during aging and storage bactericidal lamps will protect the cheese against any unwanted molds which might affect its proper aging or give it an off taste.

There is a possibility of a good application for bactericidal lamps in hog houses. A pig, while an extremely hardy animal, is subject to respiratory infection, and bactericidal lamps, therefore being able to destroy the organisms responsible for these infections, are doing a good job.

In the case of locker storage plants, the problem and solution are the same as in storage coolers. Bactericidal lamps should be installed in the receiving, processing and aging rooms, and while there are several hundred plants so equipped, we do not believe this application has received the attention it deserves for it is obvious that the better the condition of the meat before it is frozen, the better it will be at the time of use.

In all the applications I have discussed in the foregoing the problem has been one of reducing air-borne and surface contamination. I want to discuss now a different type of problem, that is, water sterilization. Since clear water, whether from a well or tap source, has better than a 50 per cent transmission to a depth of 6 in., large quantities of

water can be sterilized in relatively short times with one lamp. The most practical method of doing this is to build a shallow trough with a bactericidal lamp located two or three inches above it. Water passing under the lamp at a given rate of flow would be virtually, if not actually sterilized. As water from different sources varies widely in transmission, it is essential to have tests made before making an installation. The needs for pure water on a farm, in addition to that for drinking purposes, are numerous. As an illustration, Pacific Coast farmers prior to packing are now washing and cooling their vegetables with refrigerated water. Because of the large quantities of water involved, it is impractical from an economical standpoint to use all fresh water. Any attempt to filter it and recirculate brought on trouble, as in a few minutes the bacteria count of the water was so high as to be dangerous. The solution was found in using a half dozen bactericidal lamps over a simple trough as I have described. Now the water can be recirculated many times before it is discarded.

In conclusion, here are three main points to remember about bactericidal lamps:

1. Where air-borne bacteria are the cause of illness, mortality, or product spoilage, bactericidal lamps can be of service.

2. The basic application of this lamp is the treatment of the air and not the product, except where clear liquids and smooth surfaces are involved.

3. Clear liquids such as water, and to a lesser degree some others, can be effectively sterilized.

Victory Gardening in a Nazi Prison Camp

Condensed from The Utah Farmer

Lt. H. P. Andersen

***Editor's Note:** The author of the following article describing the gardening activities of a group of American prisoners in a German prison camp was shot down over Germany in April, 1943. He was released just two years later.*

THE soil was exhausted, almost straight sand. The plot of ground the Germans allowed for gardens in our prison yard figured out to less than a square rod for ten prisoners of war. Precious water for irrigation had to be carried in tin cans. Guards were bribed for seeds and there were no ready fertilizers. Yet farm-bred American Air Force officers at Stalag Luft III ingeniously doctored the Silesian earth to obtain vitamin-rich fruits and vegetables denied to us by the Nazis.

With hoes made by fastening discarded bully beef tins to sticks of wood we went to work in the spring of 1943. That summer was one of crop failure. Just a few radishes, a tomato which we raffled off, and a handful of onion greens were all that six of us coaxed from the stubborn soil. Next year, 1944, we were successful, but it required months of following the horses. Casing after casing of blood sausage also helped.

There were those of us in the fall of 1943 who believed the war in Europe would not end in 1944. We were the "pessimests" who wrote friends in Sweden, Switzerland and America asking for packets of seeds. By planting time in 1944 we had received a fair supply of seeds for radishes, cucumbers, tomatoes and lettuce as well as several kernels of sweet corn.

While waiting for our seeds to come through the Red Cross we looked around for a means of strengthening the soil. German rations were so scanty that little if any garbage was left to make compost fertilizer. Only badly rotted potatoes and turnips were plowed under. Best bet was to trail the oxen and horses which pulled supply wagons into the prison and hauled away the trash. If a team was in camp for a long time it could be depended on to leave droppings behind. Sharp competition developed among gardeners for this manure. Far and away the most efficient gath-

Reprinted by permission from Utah Farmer, August 15, 1945, Salt Lake City, Utah

erer was Lt. Norman L. Widen of Onalaska, Wisconsin. Widen had a homemade whisk broom and cardboard box ever ready to go into action upon tip-offs from his many friends who promptly took "fixes" on fresh piles.

His nearest competitor was Lt. Robert Rivers of Ventura, California, who at one time sought to have the senior American officer zone the camp. This may have resulted in a two-man monopoly, however, so other gardeners brought pressure to keep free and rugged individualism in the field of horse and oxen manure.

Research

"Cy" Widen kept a record of dropping locations over twelve months and established the fact that a horse is most likely to present a prisoner with a shovelful of plant gold while turning a corner and while standing at the gate as the sentry searched the outgoing wagon.

Nosed out of the manure racket as I often was, I went into research and turned rich-aromaed blood sausage into blood red tomatoes and radishes. The blood sausage was a staple in our diet, and many new prisoners of war could not swallow the stuff no matter how cleverly it was cooked or disguised. This left a surplus which I cornered at the expense of being pointed out as "Andersen eats blood sausage." About like saying a man eats maggots as far as the weak bellied were concerned. Actually I put the surplus blood on my land.

Amazing Yields Result

At first I merely sliced it and raked it in between the rows. Then at night the German watch dogs would sniff the stuff and paw and claw their way through the garden, for they loved it. So then I took to dicing the sausages and dissolving them in hot water. This soup seeped into the soil, discouraged the dogs when they couldn't separate blood from sand.

Thus last summer most men in our prison compound tasted, and sometimes even filled their stomachs, with fresh fruit and vegetables. Those who had never before farmed or gardened claimed they would in the future grow something besides weeds at home.

Most important was the time consumed in working the soil. There was no better "escape" from barbed wire psychosis than that provided by prison gardens.

A New Clover

Condensed from American Bee Journal

OF THE nearly 100 legumes planted in the American Bee Journal honey plant garden, one stands out above all the others, as entirely new and different from any now in cultivation. It is Trifolium ambiguum, a deep rooted perennial clover from the Caucasus in eastern Europe. It spreads rapidly by rhizomic roots and appears to be entirely winter hardy. Since it is new to this country there is no common name but the Iowa Beekeepers Association has asked that it be named "Pellett Clover" in recognition of the effort made in the test garden.

When in bloom this new clover has much the appearance of alsike since the flowers are about the same color although of somewhat larger size. The plant is very peculiar in its habit of growth. During the early spring months only basal leaves are in evidence. These look very much like red clover leaves but are often much larger. The three leaflets are often held erect by leaf stalks more than a foot high. Even at this stage the amount of forage is quite heavy. In late May the flowering stems appear and resemble the flowering habit of red clover more than any other although different in some respects. In our plots they are about waist high at height of bloom and each stem has many flower heads at different heights.

Instead of a deep corolla tube like red clover this new variety is very shallow and its nectar is readily available to short tongued insects. That it yields nectar freely is indicated by the large number of insect visitors, including honeybees. It seeds freely and indications on our grounds are that it will be easy to make increase with rapidity both by seeds and by means of root cuttings.

Our little field of this clover has grown from a very modest start.

About a dozen seeds came in a letter from one of our numerous helpful correspondents and were planted on April 22, 1941. Four or five plants grew from this planting but attracted no particular attention during the first summer. Since there were dozens of similar small plots of legumes it took some time to discover the particular merit of the new clover. When it came into bloom in midsummer it was noted that the few flowers were eagerly visited by honeybees although many other

Reprinted by permission from American Bee Journal, November, 1945, Hamilton, Ill.

plants were blooming in much greater abundance.

It was not until the season of 1943 that the special attractions of this plant were recognized. Officials of the U. S. Soil Conservation Service, visiting the garden noticed that it behaved differently from other clovers. When plants were dug up it was found that it spread from rhizomatic roots.

That was the signal for special effort to propagate it as rapidly as possible. In the spring of 1944 several rows about 20 rods long were planted from root cuttings. The rows were about four feet apart and the plants eighteen inches to two feet apart in the row.

By September there had been a surprising increase. A count of several clumps indicated that there were then about 19 plants for each one planted five months earlier.

Apparently underground growth continued throughout the winter since large numbers of new plants appeared in the spring of 1945. By June the entire plot was filled with plants with the greater number in full bloom.

It soon became apparent that this clover depends upon the bees for pollination. During the early bloom the weather was very cool and wet and bees were confined to the hive much of the time. During this wet period the flowers faded without setting much seed. At about the time the plants reached full bloom the weather turned more favorable and the bees swarmed over the blossoms. Seed set freely and many heads seemed to have a seed for nearly every floret.

Toward the end of the flowering period the bees deserted the clover to a large extent in favor of other flowers and there was but little seed in the later flowers. Considering the area, the set of seed made a very favorable showing. However, much of it was lost from shattering before a machine could be brought in to harvest it. This experience demonstrated that the new clover requires somewhat different handling to secure the maximum yield of seed. The seed shatters out so readily that care must be used to cut it at the height of seed setting without waiting for the later flowers to ripen. It must also be handled more carefully than other clovers in harvesting.

The root system is such as to offer great promise for use in soil conservation efforts. An old plant dug up at the time of the honey plant conference was cut off at three feet below the surface but some visitors estimated from the size at that point that it might go down ten feet. The entangled mass of roots was sufficient nearly to fill a bushel basket.

It would be hard to find a plant more promising for water-

ways, roadsides or other places where erosion is a serious problem.

Our soil is rich, loose and black. No better soil can be found. The fact that the new clover thrives so well here is no proof that it will do equally well elsewhere.

In the American Bee Journal garden it is most promising. Questions as to its adaptation to other soils and climates and what might be expected of it under other conditions have been raised.

To answer these questions nearly the entire crop of seed has been placed in the hands of the Iowa Experiment Station. It is proposed to try it on different soils and make numerous tests as to its protein content, its palatability and its usefulness when grown with grasses.

One question has already been answered as some cows from a nearby pasture got into the clover and instead of walking all over the place they started at the edge of the plot and mowed it nearly clean as far as they went. They certainly indicated an eager appetite for this particular plant.

It is highly important to know what the plant will do in the north and south and on clay soils and sandy soils as well as on wet lands and dry lands. Some time must pass before we can find out its limitations as to soil and climate. While no seed is available, live plants can be secured in limited quantity. Melvin Pellett of Atlantic, Iowa, son of our field editor, has a plot grown for the purpose of making available offshoots and root cuttings for those who wish to give it a trial. No claims can be made as to what it will do in any other situation and the plants will be offered for trial only.

Judging from our experience it will be possible to stabilize the bee pasture in localities where it proves successful by planting it along the roadsides. Its habit is such that it will not be killed by cutting and apparently when the roads are worked freely and the soil disturbed, as is so often necessary, it will grow again from the roots covered by the machinery.

Indications are that it is the equal of white Dutch and alsike clovers in its attraction to bees. Although there were hundreds of acres of white clover blooming within reach of our bees, this little field was swarming with bees during much of its bloom.

The flowering period is very similar to that of alsike and red clover. While there is some bloom earlier and later, the main flowering period is from the first of June until the fifteenth or twentieth of July.

Advantages of this clover as we see them from the beekeepers' standpoint, are: (1) its apparent permanence when once estab-

lished. (2)its abundant flowers with nectar readily available. (3) its habit of spreading from the root which insures an increase in the stand even though it is not permitted to form seed. (4) the extensive root system which serves to prevent erosion and makes it so attractive for use in soil conservation.

Roots have been found to branch at varying depths below the surface and since a portion separated from the main root continues to grow, little damage is indicated from winter heaving. Our original plants dug up at four years of age gave every indication of prospect for a long life. The short life of sweet clover and most other clovers is the worst drawback to their culture. A long lived plant is certainly to be desired from the standpoint of bee pasture.

A Hog for the One-Sow Farmer

Condensed from Breeder's Gazette

Kenneth Hinshaw

IN THE U. S. a few farmers grow a lot of hogs and a lot of farmers grow a few hogs. I want to talk to the fellow who is going to gear his swine project mainly to stocking his freezer locker and treating his family to pork that suits the king's taste. You big operators can listen in and maybe get an eyeopener.

The usual American hog renders 30 lbs. of lard. That's more than your family needs and much more than your wife wants. Furthermore, every cut of pork from an American-style hog cooks off surplus grease that overflows the dripping pot; and it took 4 or more lbs. of grain to make each lb. of this unwelcome grease. That grain could have made lbs. of better-eating, leaner Yorkshire pork.

I know of a New England farmer who has just dressed 6 Yorkshires averaging 260 lbs. All the lard from all 6 would not fill a 50-lb. pail. These were October pigs butchered in July. They followed some feeder steers and had skimmilk—nothing else. This low-lard specification of the Yorkshire is an answer to the lard problem which animal husbandry authorities are worrying about. With the present American hog rendering

Reprinted by permission from the Breeder's Gazette, September, 1945, Louisville, Ky.

about 30 lbs. of lard, 70 million head make a 2-billion-lb. lard harvest — about twice as much lard as American appetites normally relish even at bargain prices.

The Yorkshire is a white, perk-eared English hog distinguished for its long, smooth bacon sides. Beamed at the famous "Wiltshire side" export bacon trade, Yorkshires have been bred to produce a quality of meaty bacon capable of pleasing the fussiest of breakfasters. You might just as well eat that kind of bacon at your own table. The hams, loins and shoulders of a Yorkshire are equally favorable to modern tastes. The proportion of fat to lean is right—and a good feeder can put the marbling in there without a wasty finish.

Yorkshires are prolific and great milkers. Gilts often farrow and raise 8, 10 or 12 pigs their first litter. Older matrons are almost too liberal. Canadians have kept a sharp eye on motherhood and productiveness and American breeders through their Advanced Registry are going right along in maintaining these qualities. The first 45 American AR litters averaged 11.2 pigs farrowed, 10 raised. The heaviest litter weighed 55.6 pounds at 56 days.

Yorkshires are a docile, easy-to-manage hog and the breed consistently offers the one-sow farmer a highly efficient producing unit. That means there'll be low-cost weanling feeders to sell to your neighbors.

Feed utilization is something to check in your pig specifications. Canada's Advanced Registry system involves the actual feeding out of 4 pigs from each candidate's litter at a government testing station. From the accurate records thus compiled it is apparent the Yorkshire can hit those popular 175 to 225-lb. weights in 5 to 6 months and swap a lb. of pork for 4 lbs. of grain just as readily as the lardy American breeds.

But the Yorkshire seems to have another trump in feeding characteristics. Canadian farms, where a lot of England's bacon grows, do not have such prodigious grain resources as do our Mid-West farms. This has forced upon the Yorkshire an adaptability to grass and succulent feeds less well developed in American breeds. One of my friends wintered December pigs on a mixture of ground clover hay, middlings and ground corn and oats. In May these pigs began pasturing ladino clover. Skimmilk was the only other feed used throughout the summer. Butchered in Sept., these Yorkshires dressed 165 lbs. (73.4% of live weight after 24-hr. shrink). They made firm, well finished pork and the butcher selling them said they pleased his customers so well that

they were praising this pork for days after he sold it.

For the fellow who wants to cut pork-making costs with pasture this is a pleasant consideration. To fit a few hogs into the diversity of many American farms, this white, bacon-type breed has exceptional adaptability. Its specifications are worth examining. Already American breeders have skimmed Canadian herds for some of the best individuals and for samples of all the better bloodlines. Not all the good Yorkshires are across the border. And not every "imported" Yorkshire is necessarily a good Yorkshire. Furthermore, Americans and Canadians have some different ideas about a hog's refinements. Under English influence, Canadians tolerate flatter toplines and weaker pasterns than Americans like to see.

Another caution is that most American Yorkshires are in the hands of comparative novices in hog breeding. Few big-time breeders have applied their talents to the breed. When they do, considering the sound backlog of utility characteristics Canadians have bred into the breed, the prospect for Yorkshires to become one of livestock's spectacular revolutions is exciting. For today, buy your Yorkshires cautiously for there are no "hero" herd sires or fabulous breeder reputations to lure or guide the beginner.

Yorkshire enthusiasts are plugging along on a conservative, humble program of development under the leadership of the American Yorkshire Club, Harry G. Krum, of Valparaiso, Ind., is secretary of the club. The Eastern Yorkshire Club is emphasizing appeal to the one-sow farmer and trying to avoid having the breed's present mild eastern boom turn into the usual scramble to speculate on the breed's growing popularity.

Kenneth Hinshaw is secretary of the Eastern Yorkshire Club, 95 Elm St., W. Springfield, Mass.

Sunlight Reduces B-2 Milk Value

Condensed from The Western Farm Life

IF THE dairy industry expects whole milk to hold its pre-eminent position as the most relied on source of riboflavin—formerly known as vitamin B2—it must either package that milk in brown glass or paper bottles or secure the cooperation of the customer in revising the home delivery system so that the clear glass bottles are protected from strong light. Such is the conclusion to be drawn from experiments at the University of Idaho college of agriculture.

D. R. Theophilus and O. E. Stamberg of the Idaho station found that milk exposed to daylight on a clear March day lost 80 per cent of its riboflavin content within 4 hours—and many bottles remain on back porches or steps without protection nearly that long after delivery. On the other hand, the riboflavin loss in milk in brown glass bottles and most paper bottles under identical light conditions is only about 10 per cent. Subsequent tests under stronger summer light conditions resulted in the same comparative losses between the different types of containers. Included in the test were two conical type and two square type paper board containers.

The Idaho investigators point out that while there is much yet to be learned about riboflavin, and what it does in the human body, it is known to be absolutely essential to growth. Riboflavin deficiency in the human dietary is known to be common in this country. The significance of riboflavin to human welfare is becoming more apparent as science learns new things about it.

In the Idaho tests with paper board bottles it was found that thickness, density and color of the paper board apparently are important factors in protecting the riboflavin. Three of the four paper bottles gave protection equal to that of brown glass bottles while the fourth, of a lighter weight and color, did not rate so well.

Paper bottles were well on the way toward general acceptance when the war curtailed their use. People objected to them at first because they couldn't see the cream line and there was a psychological factor involved in seeing the milk through the clear glass. Increased use of homogenized milk, in which there is no cream line (because the cream is distributed throughout the milk) also will be a factor favoring greater use of the paper board containers.

Reprinted by permission from Western Farm Life, Denver, Colorado, October 15, 1945

Importance of Being a Good Judge

Condensed from The Shorthorn World

Carl W. Gay

Ohio State University

BREEDING accomplishes the regulation of the progeny by control of the parents with the purpose of improvement. Its practice is based on scientific principles but its results cannot be anticipated with as much accuracy as usually characterizes an exact science. The engineer figures his projects to the fifth decimal and his machines are precise to one-thousandth of an inch in their performance.

There is nothing so absolute in a breeder's achievement. He can only approximate the objectives of his operations. Even in the most closely studied and planned matings there is an element of chance that cannot be completely overcome by the breeder. The physical basis of inheritance is composed of the determiners of characters whose assortment is purely incidental. The only way inheritance can be governed at all is by mating individuals both of whom are as nearly pure as possible for the determiners of as many of the characters desired as possible. The fact of this purity is established by the pedigree which records the ancestry and by the progeny which is the real measure of transmitting ability.

The plant breeder can establish the pure line so his parent stocks breed true, but the livestock breeder, with his more complex subjects can establish a pure line only for certain characters such as color or horn. That is why regulation, an approximate attainment, is the best the breeder can do with the unborn generations—the progeny. The one place he can be absolute is with the arrangement of parentage—this cow shall have her calf by this bull and not that one.

Only by the absolute control of the parents will the progeny approximate the desired type and character. This control of parents is selection and in its practice judgment is exercised. Hence the practice of judging is at the very root of livestock improvement. The selection of foundation females, the herd sire to which they are to be bred, the sorting and culling of the calf crop—some to be retained as potential herd bulls, some as replacement brood cows or sale heifers, while some possibly are to be castrated and

Reprinted by permission from The Shorthorn World, Aurora, Illinois, May 25, 1945

fed out for market—is an every-day application of judging on the stock farm.

Anyone who operates in any field of livestock production must practice judging. The purchase of a carload of feeder cattle, topping out several loads or perhaps an outfit's entire calf crop, calls for the best judgment to be successful. And so it is in deciding when cattle are finished for market, while the person who capitalizes most regularly and extensively on his skill in judging is the packer buyer.

This routine application of judging is so commonplace that its importance to the breeder or the livestock producers is often overlooked. In fact livestock judging suggests to too many people only the distribution of blue, red and purple ribbons on tanbark with the bands playing and crowds applauding. Some critics of agricultural college courses have opined that too much time was allotted to judging, assuming presumably, that show-ring judging was the only application to be made of the proficiency acquired in classroom study and practice.

Show-ring is the glamorous judging job, but its importance should not be under-estimated in an effort to show up the more usual judging on the stock farm. He who establishes show ratings assumes a position of great responsibility since he sets up the pattern by which the breeder is guided in his selections. Show-ring awards may, therefore, lead or mislead the rank and file of the breeders, depending upon the competence of the one doing the judging. But to every judge who ties ribbons in the show-ring there are hundreds who practice judging of equal importance though in a less conspicious way. Judging by the breeder is also more comprehensive in its application, because it is not limited to individual merit as in the show-ring, but combines a consideration of show-ring form with pedigree and possibly with progeny.

Ambitious young stock men and older ones, too, are often impressed by the importance of a show-ring judging assignment and the twenty-five to one hundred dollars per day fee seems big pay. Such an ambition is commendable, but the same interest and effort to do a good job in the purchase of sires and foundation females, sorting out from the calf crop the ones to be retained for breeding purposes from those to be unsexed and fattened for market, culling out females from the breeding herd and determining matings, will return bigger dividends over the years in a successful, constructive breeding enterprise than a few days each season in the show-ring, even at one hundred dollars per day.

Sound judgment in the selection of breeding stock is the keystone that locks the arch of the breed or herd structure, and without it, the other skill involved in livestock husbandry such as feeding, management and salemanship may be of little effect.

Stop Losses in Feeding

Condensed from Wallace's Farmer and Iowa Homestead

WHEN FEEDING margins are close, livestock men have to watch the corners. You may turn profit into loss by bad management.

Fast gains are the cheapest on hogs. There is no economy in slow gains except when cheaper feed is in sight. There is no chance of cheaper feed now; feed may be higher. Full-feed the hogs.

Too much corn will slow down hog gains. Feeding trials at seven stations show that pigs gain twice as fast when corn is balanced with protein, compared with feeding corn alone. At least one-tenth of the hog ration should be a good protein feed.

Mixed grains and mixed proteins are better for hogs than one grain and one protein. Soft corn, particularly, will put more gains on hogs if mixed with some wheat, oats or barley. Supplement should contain both animal and vegetable proteins.

Alfalfa meal, made from green, leafy hay, gives dry-lot hogs what they get on grass in summer. Brood sows should have 15 per cent alfalfa meal in their rations. Fattening hogs can use 5 per cent to good advantage.

Dry-lot feeding requires minerals and salt for fast gains. Salt doubled gains in a recent feeding test which compared pigs in a lot with no salt with another lot of pigs getting all the salt they wanted. Keep both salt and minerals before the hogs.

Both proteins and minerals are needed in animal rations. Neither one will replace the other. They are a team which makes it possible for animals to make the best use of home-grown grains. Be sure both are in the hog lot.

Topping off the hog herd may help hog profits this year. Market gluts mean prices below ceilings. To insure against this danger, sell the hogs a few at a time as they reach good finish and weights.

Soft corn is one of the problems this year for the feeders of hogs, cattle and sheep. How much is soft corn worth compared with

Reprinted by permission from Wallace's Farmer and Iowa Homestead, Des Moines, Iowa, December 15, 1945

sound corn? The South Dakota experiment station reports on that after two years' experiment:

Dry matter in soft corn is worth about 90 per cent as much as the dry matter in sound corn. This is an average for cattle, hogs and sheep. Cattle make the best use of soft corn, followed by hogs and sheep, in that order.

When shelled, and containing 30 per cent moisture, soft corn would be worth 74 cents per bushel for feeding; at 35 per cent moisture, it would be worth 69 cents. Comparison is with 15 per cent moisture corn with 47.6 pounds of dry matter and worth $1 per bushel.

New Kind of Sugar

A new kind of sugar, derived from the lichen plant, has been developed by Soviet bio-chemists to help relieve the acute shortage caused by the Nazi destruction of approximately 85 per cent of Russia's sugar beet crop, according to a Russian Relief agricultural report.

Called "polar sugar," this substitute is already being produced on a small scale, but plans are now underway to increase production through the establishment of a chain of small refineries.

The technique for converting the sweetening and nourishing potentialities inherent in the lichen plant into snow-white sugar tablets was devised by Prof. Andrei Kursanov, of the Institute of Bio-Chemistry of the Soviet Academy of Sciences. The conversion process first subjects the lichen plants, which grow in the far northern region of the Kola Peninsula, to the action of a sulphuric solution. The plants are then changed into sweet glucose molasses, suitable for consumption. Finally the molasses is put through a process of centrifugalization which transforms it into crystallin glucose.

Use Litter for Five Years?

Condensed from Everybodys Poultry Magazine

G. T. Klein

Massachusetts State College

If you haven't seen laying house pens with two, three, four or five year old litter on the floor, you may have a surprise in store for you. You'd probably be equally amazed if you saw for the first time two or three broods of chicks that were raised on the same litter.

Wet litter on poultry house floors was so bad in New England a decade ago that houses were like a hog mire most of the winter. Birds waded through this muck getting their feet muddy, and when they went to the nest not only soiled the eggs which they laid, but also soiled other eggs in the nest. The house was so wet that it was an obnoxious place to work.

This condition was rather universal. Some of the insulated houses where birds were started early in the summer got along better. But there was nothing very sure whether a house would come through the winter in dry condition. There was no positive way to ventilate a building and be certain about the dryness of it.

Then came the litter and labor shortage during the war. Some poultrymen found it impossible to clean their houses because neither litter nor labor was available. They either had to take the chance of housing pullets in an uncleaned house or not winter them. They took the chance, and to their surprise, losses were no higher than normal. It was amazing to see the dryness of the litter in these pens.

Litter in pens at Massachusetts State College was no different than on poultry farms. We could not keep it dry in cold weather, and changing did little or no good. New litter became packed and wet in a week's time. Now if you'll visit the plant, you will find litter that is three years old and is powdery dry even in zero weather. We seldom have a dirty egg. As for mortality, it has been slightly lower than with new litter each fall. If we can carry the litter over without getting into trouble, I'm all in favor of it because it has tremendous advantages.

Disease Hazards

I've tried to state the facts about litter fairly and never to encourage one to use it that might

Reprinted by permission from Everybody's Poultry Magazine, Hanover, Pa., April, 1946

get into serious disease problems because of carrying it over. It's easy to see that if bacterial diseases are present, one would be running a great risk to carry the litter from one flock to another. We have had no diseases in our flock which have made it hazardous.

The usual precautions are taken in the control of lice, while a yearly painting with carbolineum seems sufficient to control red mites. Scattering flowers of sulphur in the litter will take care of fleas.

Events which led to use of the same litter for two or more broods of chicks were similar. Poultrymen did not have new litter to put in their pens and they did not have labor to change it. Yet when they raised one brood after the other on the same litter, they seemed to get along about as well as on new litter. Of course, they had coccidiosis, but few broods escape it regardless of methods. It did come on early and they seemed to build up immunity against it when the chicks were exposed to it on the old litter. Perhaps the deep layer of litter on the floor has something to do with disease control.

Those are trends I've seen developing recently. Maybe like a great many other trends, we will swing back to what was once considered strict sanitation. I'm sure, however, that we can say that the longer we use litter, the better it becomes from the standpoint of dryness.

The January and February hatched pullets which are housed in June or July get a chance to grind up the litter and build it up before cold weather. They can be started on new litter and have dry conditions if the litter isn't changed.

Massachusetts growers have also had good success in taking litter from brooder houses and using it in laying pens. This is built up and stays remarkably dry. We have seen no particular disease hazard from it in most instances.

The poultry department of Cornell University reported on tests with various litters to determine the moisture absorptive power. Here is the relative rating of some of the common litters as they found them.

Litter	Absorptive Ability
Peat Moss	4.5
Sugar cane (coarse)	4.4
Straw	4.4
Sugar cane (fine)	4.2
Peat moss and shavings	3.7
Sawdust	3.3
Hay	3.2
Shavings	2.5
Oat hulls	1.4
Sand and gravel	0.14

Here are some litters commonly used in brooder and laying pens with poultrymen's appraisal of them.

Sand—A very satisfactory litter, in spite of rather low absorptive property, particularly when mixed with another litter such as shavings or sugar cane. It is heavy to shovel in and out of houses, but in spite of this, is very extensively used.

Shavings—Rather low in absorptive power, but a satisfactory litter when gradually built up to a floor covering of considerable depth. It is more satisfactory when mixed with sand. The objection that shavings are injurious to the soil when the floor manure is used as a fertilizer is not well founded. Tests have shown that the usual application rates do not cause an acid condition, as has sometimes been claimed. Dry shavings are much more satisfactory and safe than green shavings.

Peat moss—An excellent litter in most instances, with the reservation that it does get very dusty in some instances. The peat now available is from bogs in the United States and Canada and varies in moisture absorptive value. Tests to determine the value of a sample are usually the only way of knowing its worth.

Sugar cane—A highly absorptive litter that rates as one of the very best litters. It is extremely satisfactory for laying houses and for brooders.

Straw—Oats, wheat, and rye straw are all highly absorptive litters that are extensively used by poultrymen. They mix well with other litters including sand and are readily available on general farms. Mold must be avoided.

Sawdust—When dry, a very satisfactory brooding litter and fair for the laying house.

Ground corn cobs—Very satisfactory for brooding, but less favored for the laying house. The cobs are ground in a hammermill to pieces about one-quarter inch in size.

Peanut hulls—Very satisfactory for brooding, but seldom used in laying houses. More information is needed on the merits of this litter for the laying pens.

Cottonseed hulls—Rated as a satisfactory brooding litter.

Shredded corn fodder—Dried corn fodder shredded or cut in silage cutter is a satisfactory laying house litter. If finely cut, its rating for the brooder house is also satisfactory.

Cut-up hay—Also a satisfactory litter for laying house or for brooding when clean hay, free of mold is put through an ensilage cutter.

Use of Hydrated Lime

Hydrated lime is one of the chemicals which has a decided drying effect on litter. It is scattered on the floor litter in the fall or winter at a rate of one pound to about 3½ square feet of floor area. Another method of

expressing it is one pound to each bird. There is some loss of nitrogen due to the action of lime, but it is believed to be rather nominal in fresh manure.

Superphosphate used at a rate of 27 pounds a week to 100 hens is suggested in a Pennsylvania bulletin. It is spread over the droppings boards, pits and floor litter.

A Program To Keep Your Litter Dry

In the Laying House:

1. Start early housed pullets on 2 or 3 inches of litter, building it up to 6 inches by December 1. Make the additions of litter at weekly or two week intervals.

2. House pullets that go into pens after October 15 on litter from the brooder house or if the disease hazard is not too great on last year's litter.

3. Rake or turn with a fork, or in some other way stir the litter at least twice weekly. Feed some grain in the litter daily to induce scratching.

4. Provide a drinking device from which the flock cannot spill or throw much water. When this is not possible, remove the wet litter around the fountains as often as necessary.

5. Regulate the ventilators according to weather conditions. It is almost an individual problem, varying with location and house construction. In cold weather, it is a good rule to close the windows and ventilators as tightly as possible, yet prevent excessive condensation on the inside of the pens.

6. Do not change the litter because it gets damp. New litter in mid-winter soon becomes wet. Renew the wet litter around the fountain and make the best of the conditions.

In the Brooder House:

1. Start with a floor covering of dry litter of about 1½ inches in depth.

2. Cover the litter with newspapers for three or four days to prevent the habit of litter eating from developing.

3. Rake the litter at least every second day shifting it about the house as conditions warrant because of dry spots in some areas.

4. Add some litter about once a week, building the layer up to 5 inches or more in depth.

5. Do not change the litter during the entire brood.

If the brood of chicks is free of communicable diseases, it is not amiss to save the litter from the brooder house to use in the laying house or for another brood of chicks.

New Life for Old Southern Product

Condensed from The Southern Planter

Mena Hogan

"WHAT are you puttin' in my cornmeal?" A. F. Hudson, Greenwood County, South Carolina, one of the 100 millers cooperating in a voluntary corn meal enrichment program for the State, smiles as he repeats this remark of his customers.

"I always explain," he says, "that what I've been adding makes a whole grain corn meal one of the very best cereal foods. That it's a food which will help keep the family healthy!"

Turning to his mill, Mr. Hudson points out a small feeder attachment. Demonstrating the way it works, he turns a small wheel on the feeder. Immediately a tiny trickle of a whitish looking mixture falls into a bin along with a much larger stream of corn meal. So mixed, the product is enriched whole grain corn meal.

There is a definite relationship between this enriched food and the health of Mr. Hudson's customers' families, for the mixture described above, when added in the ratio of ¼ pound of enrichment mixture to 100 pounds of corn meal, yields a product having vitamins and minerals conducive to good health. A half-pound of enriched meal contains not only 8 milligrams of much needed niacin but 75 per cent of the vitamin B1, 33 per cent of the calcium, and 65 per cent of the iron necessary for a person's minimum daily requirements.

This method of enriching a food already in common use throughout the South is an important part of the nutrition program being sponsored by the South Carolina State Nutrition Committee.

This State has an enrichment law which requires the enrichment of bread, corn meal flour, grits and oleomargarine. The State law, however, does not cover the corn meal ground locally in small mills. Hence the program for voluntary enrichment by the miller himself.

Some of the small mills grind only a few bushels a day, primarily for the convenience of neighboring families. Others have a capacity for from 50 to 75 tons a day. There are between 1,200 and 1,500 mills in South Carolina.

Some millers have not been as easy to convince as Mr. Hudson of the value of enrichment. They

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reason that since they already grind a whole grain product, there's no need to add anything to it. Sort of "gilding the lily," they feel.

So they must be convinced, according to Janie McDill, Food Improvement Specialist with the Extension Service, that corn meal when used as extensively as it is in the diets of South Carolina families and not supplemented by plenty of milk, meat, eggs, fruits, and vegetables may even contribute to poor health! The incidence of pellagra and nutritional anemia among families who subsist largely on corn meal is well known. Authorities, too, have cited the deficiency of niacin and iron in corn. Those who eat large quantities of corn meal usually have a rather restricted diet lacking in these two essentials. By enrichment the natural deficiency of niacin and iron in corn is corrected.

"Our best chance to influence millers to adopt the new practice of adding minerals and vitamins to corn meal," says Miss McDill, "grew out of the fact that most millers are pretty good mechanics. So they were always interested in seeing how the feeder could be attached. Once on the mill, it has rarely been removed."

Usually, the miller himself is the best advertisement of the values of enrichment in his contracts with his customers.

Displayed at all the cooperating mills, too, is a large colored poster telling of the practice and proclaiming that this particular mill has this service for its patrons.

A potent factor behind the success of this movement in South Carolina is the ease with which the enrichment mixture is added to corn meal. The mechanical feeder, of course, is responsible. E. J. Lease, Associate Chemist, Clemson Agricultural College, working with the engineers at the college, is largely responsible for its development. Funds from the Williams-Waterman Fund for Research Corporation have supplemented the work of the South Carolina Experiment Station in both the development and promotion of the feeder.

A few millers became so interested in the enrichment program that, before the feeder could be installed in their mills, they actually mixed in the enrichment by hand.

The Cost Is Small

The low cost of enrichment has influenced its use. According to Dr. Lease, the cost of enriching whole corn meal is only about 1¼ cents a bushel. Some millers absorb this cost themselves, feeling that they are giving a service to their neighbors. Others pass the small cost to the patrons by taking out slightly additional amounts of toll. (The usual toll

or charge for grinding corn meal is one part out of 6 or 8, depending upon the price of corn.)

The educational program accompanying the placing of the feeders has had a wide influence in the success of the new practice. Home demonstration agents and foods leaders in home demonstration clubs have demonstrated throughout the State that enrichment produces no change either in taste or baking quality of the corn meal product.

A popular bulletin put out by the South Carolina Agricultural Experiment Station, Clemson, helped to promote the educational program in enrichment. Called, *"Questions and Answers On the Enrichment of Corn Meal, Flour, Bread and Grits,"* this circular has had wide distribution in South Carolina and other Southern States. This bulletin points out in interesting form the purpose of the vitamins and minerals added to the product when it is enriched.

Riboflavin, for instance, is quoted as being the vitamin that protects the eyes and skin. Iron is said to prevent nutritional anemia. Calcium is listed as needed to build strong bones and sound teeth. Niacin is said to prevent pellagra. All are found in enriched corn meal. Actually, according to this bulletin, enough niacin can be purchased to prevent pellagra for a year for three cents a person.

Other Southern States are watching the progress of the program in South Carolina with much interest. A few scattered mills in Georgia, Alabama and Mississippi are enriching whole grain corn meal. Nutrition leaders feel that a program, such as South Carolina has initiated, has great possibilities throughout the South.

New interest generally has been attached to the use of corn meal as a result of the enrichment program. "Virginia Spoon Bread," "Corn Dodgers," "Hot Water Cornbread," "Corn Meal Mush," "Johnny Cake," "Hush-Puppies," and many other old-time recipes have again come into prominence as thoughtful homemakers make new use of an old, improved product.

The Chicken of Tomorrow

Condensed from The Ohio Farmer

C. M. Ferguson

Extension Poultryman, Ohio State University

SPECIFICATIONS for a better meat-type chicken have been drawn up. Copies were sent to thousands of poultrymen throughout the country by the Chicken-of-Tomorrow Committee. The committee's goal is the development of birds that will grow faster and produce larger portions for the consumer's dinner table.

This effort to produce a type of chicken for the future that will yield greater profit for the producer and greater satisfaction for consumers is open to all poultrymen. It is a three-year breeding contest and $8,000 in cash awards is provided for the breeders who produce the best results.

Members of the Chicken-of-Tomorrow Committee who are directing the program represent the major national and state poultry organizations and federal and state agricultural agencies. The program sets up a definite goal for poultrymen to work for and provides incentives that are worthwhile. It also is intended that it should attract nation-wide attention of not only those engaged in the poultry industry but consumers as well. The combined result should be that poultry will be placed in a better position to compete with other foods for a place on the nation's dinner tables.

It is well known that the component parts which are desired for the creation of a superior chicken of the future now exist. They are scattered through many breeds, strains and varieties of chickens. What is needed is to bring as many as possible of these desired qualities together in one strain, variety or type of chicken.

To accomplish this may mean the creation of a new breed of chickens, the improvement of an existing breed or production of crossbred chickens.

Poultry scientists in colleges and experiment stations have been working along this line for several years. They recognize the need for experiments by as many breeders as possible to hasten accomplishment of the desired goal. With this in mind, the plan for carrying out a nation-wide breeding program was suggested

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by A & P food stores to a group of industry leaders last year and an offer was made by the food chain to furnish the necessary funds. This includes the $5,000 final award, an additional $3,000 for progress awards and administrative expenses.

Poultry geneticists were called upon to help draw up specifications for the type of chicken that is desired. These plans were submitted to more than 600 others in the industry before they were adopted.

Briefly, the Chicken-of-Tomorrow program calls for devoting the first two years, 1946 and 1947, to tests and demonstrations. Only 50 to 300 baby chicks are needed to start with. These must be identified at hatching time by wing bands, toe-punching or segregation. All must come from flocks of known parentage and the contestants must be able to reproduce their entries.

The chickens will be reared on the contestants' own farms hatched between April 1 and May 15 and exhibited at the State Fair, if held, or at time and place arranged by the state committee. Contestants will select 15 cockerels when they reach the specified age and send them alive with a certificate of date of hatch to a central dressing station. They will be dressed alike and the best 12 will be submitted as the entry.

In 1947, outstanding entries from the states will be entered in regional contests. Recognition will be made by the national committee for breeders whose entries show definite development of meat-type characteristics. Certificate of Quality awards will be made in the state contests in 1946 and 1947 and Certificate of Merit awards will be made in the regional contests next year.

Participants in the final contest in 1948 will be required to send lots of two cases (720) eggs to a central hatchery to be designated by the national committee. These eggs will be hatched and the chickens reared under identical conditions. They will be judged and the $5,000 award will go to the breeder whose birds score the most points from the standpoint of all factors involved.

Specifications, score cards and an entry blank, together with detailed information about the program are contained in descriptive booklets that are now available. They may be obtained from the national committee secretary at 10 East 40th St., New York 16, N. Y.

Blueberry Growing

Condensed from The Rural New-Yorker

George L. Slate

THE improved high bush blueberry is the most recent addition to our cultivated fruits. Prospective commercial growers and home gardeners are showing much interest in this new crop, and are setting all the available plants as fast as they are produced by the nurseries. This comparatively new industry started in New Jersey, with the first commercial shipments of fruit being made in 1916. More recently, extensive plantings have been made in Michigan and North Carolina. Elsewhere the plantings are scattered, but the present interest indicates that commercial plantings may be expected where soil and climatic conditions are suitable.

Blueberries offer many inducements to the grower. The berries are a delicious fruit and popular for dessert, pies, muffins and puddings. They are well adapted to canning and freezing. The bushes are long-lived and reliable croppers. They are adapted to soils not suitable for many crops, but this special requirement limits their culture to these areas. The berries ship and handle well and need not be picked more often than once a week, in which respect they have the advantage over the highly perishable raspberries and strawberries. Prices, too, have been high and the large size of the domestic berries makes them sell readily in competition with the wild berries. The principal drawback to their culture is the high price of the plants which may run up to $500 an acre with the best varieties. This is not as bad as it seems as the bushes will last a lifetime, if well managed and grown under favorable conditions.

Blueberries grow naturally on sloping upland areas, as well as in low swampy places that are subject to late spring frosts. The flowers are somewhat more tolerant of frost than those of the other fruits blooming as late as the blueberries, but one should not depend too much on this frost resistance when selecting a site, because in frost pockets crops will sometimes be lost. If sloping land is not available, the site should at least be open and airy. Good air circulation is also important in reducing losses from the fun-

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gous disease, mummy berry, which is more serious where moisture remains long on the foliage.

The soil requirements of the blueberry are specialized and different from those of the other fruits and most crop plants. Wild blueberries grow on acid soils, and in cultivated plantings it is also essential that the soil be acid. It has been determined experimentally in Michigan that optimum acidity ranges from a pH of 4.0 to 5.1. In neutral or alkaline soils the plants make poor growth and eventually die. Where the acidity of the soil is not known, it should be tested. State Experiment Stations and Extension Services will make these tests and advise the prospective planter as to the soil's suitability for blueberries. If commercial plantings of considerable size are to be made, one should be certain that the soil is suitable before making any substantial investment in plants. The presence of wild blueberries is an indication that the soil is sufficiently acid for blueberries.

The soil should be sandy in texture and well supplied with organic matter. In some areas the organic matter in blueberry soils is of a peaty nature. The home gardener can supply this by spading in liberal amounts of acid peat. Although blueberries often grow in swampy places, the roots are on hummocks that are not submerged during the growing season. The optimum water table is from 14 to 22 inches below the surface while the plant is in active growth. Flooding during the dormant period is not injurious. The plants will grow vigorously and produce satisfactory crops on rather dry sites if the soil is well mulched to prevent moisture loss through evaporation from the surface. For several years the writer has observed the growth of nearly 100 plants on a dry sandy knoll with the water table many feet below the surface. Half of the plants were mulched with sawdust and grew very well; the other half were clean cultivated and never made satisfactory growth. Many died and were replaced until finally one very hot dry Summer killed them all. The mulched plants all survived and fruited heavily each year. If mulching materials are available, it is possible to grow blueberries successfully on soils that are otherwise too dry for clean cultivation.

Through the efforts of plant breeders the modern blueberry has come a long way from its wild ancestor. About 30 varieties have been named, but many of the older sorts have been superseded by the newer varieties although they are still being sold by some nurseries. The later ripening varieties are preferable in the north, in order to avoid competition with early fruit from areas in the

south. For those with roadside stands or nearby outlets, both early and late sorts should be grown to have fruit as long as possible. The Jersey is one of the best late sorts and may be considered standard. A promising new variety is Pemberton. The bush is very vigorous and bears very large high quality berries. The scar or point of attachment of the berry to the stem tends to tear when the berry is picked, thus impairing its keeping quality, especially in wet weather. Other recent varieties that promise well are Burlington, Atlantic, and Dixi. Stanley is of highest quality, but the berries are often too small during the latter part of the picking season. Early varieties are June and Weymouth.

Not all authorities agree as to the need for cross pollination, but even though self pollination will produce a crop, there is good evidence that the berries from cross pollinated flowers will be considerably larger. It is therefore advisable to plant more than one variety.

Blueberries are usually set in the spring. Two year plants are best for general planting. Older plants are satisfactory but too expensive. Rooted cuttings are less expensive, but too small for field planting. They may, however, be lined out in the nursery for a year and set in the field a year later. Plants are best purchased from growers who specialize in blueberry propagation. The soil is fitted as for other small fruits, a good crop being as essential as with any crop. The rows should be from eight to 10 feet apart with the plants four to five feet apart in a row. Vigorous varieties like the Jersey and Pemberton need the wider spacing. In the home garden the narrower spacing is sufficient.

Mulching is the ideal method of soil management if a suitable material is available at a reasonable cost. Sawdust is very effective if it can be had. Marsh hay and straws are also good. Legumes should be avoided, because their use will cause the blueberry foilage to turn yellow. Just why this occurs is not known, although it may be due to too much nitrogen. Those who must cultivate to control weeds should remember that blueberries are very shallow-rooted and that deep cultivation will most certainly destroy many roots and seriously injure the plants.

The plants should not be fertilized the first year, but thereafter fertilizers may be used regularly. Considerable judgment is necessary since soils vary greatly and recommendations covering all conditions are not possible. In Michigan, good results have been obtained from 335 pounds per acre of a 5-10-12 formula made up of sulfate of ammonia,

superphosphate and sulfate of potash. On very acid soils, nitrate of soda may be substituted for the sulfate of ammonia. On soils not very acid, the latter material is preferable as it tends to make the soil more acid. Another formula for the bearing plantation is 150 to 200 pounds of nitrate of soda or its equivalent in sulfate of ammonia or ammonium nitrate and 300 to 400 pounds of superphosphate to the acre. Where mulching is practiced, especially with sawdust, the nitrogen carrier should be doubled for the first few years until a vigorous growth of the plants indicates that it may be reduced.

The berries are borne on wood of the previous season's growth. The most vigorous wood produces the largest berries. Pruning is one way of stimulating a vigorous new wood growth. Blueberries tend to overbear, and unless the crop is reduced by pruning the fruit will be small and too little wood will be produced for next year's crop. The tendency in the past has been to prune severely to obtain the large sized berries for which the cultivated varieties are noted. Recent experimental work has shown that lighter pruning results in substantially larger crops although the berries are smaller.

During the first three years little or no pruning is necessary. Thereafter, regular annual pruning should be the rule. In pruning the dead and broken branches and any near the ground are removed. Usually one or two old canes from each individual plant should be taken out each year, especially if the bush is becoming dense. The new shoots from the base should be thinned, leaving only the stronger, and keeping in mind that these are to replace the older canes as they are removed in future years. The fruiting laterals may be thinned moderately if the bush appears crowded, and previous observation indicates that the plants are overbearing. Home owners who want the utmost in berry size will want to thin more severely and cut back the laterals to three to five buds. The work may be done at any time during the dormant period.

Watch the Feathers Grow

Condensed from Poultry Tribune

Paul B. Zumbro

WHEN chicks are 10 days of age, it is time to begin selecting those to be kept for breeders. As a matter of fact, this is about as late as one can tell with a high degree of accuracy whether a chick carries the sex-linked, recessive factor for fast-feathering. They can be selected for this character at hatching time, but not quite as easily as at 10 days of age.

The aim of every hatching-egg producer is to use the best available cockerels for breeding, yet all too often only one selection is made and that just preceding the breeding season. One selection a year is not enough. The best cockerels may have been used or sold as broilers or fryers. Flock-selecting agents frequently find in the fall that in a flock where 10 roosters are needed, only 11 or 12 are available for selection, and that these have not been specially selected.

Anyone producing hatching eggs can greatly improve the quality of next year's poultry simply by making a proper selection, at 10 days of age, at 8 weeks, and at maturity, of the cockerels to be used for breeding purposes. This is a practical and inexpensive means of flock improvement and yet one that is not used to the extent that it should be on many farms.

Cockerel selection is emphasized more than pullet selection for two reasons: (1) Each cockerel, on the average, is the parent of 12 to 16 times as many chicks as any one pullet; and (2) the selection of the cockerels can be 12 to 16 times as rigid due to the fact that the normal sex ratio produces as many cockerels as pullets, yet in the breeding flock one cockerel is enough for 12 to 16 pullets. The careful selection of female breeders should not be overlooked, of course, as both parents contribute about equally to the inherited quality of the chick. A sufficient number of pullets should be raised to permit a good selection of the ones to be used as breeders.

The physical characters for which cockerels should be selected include the following:

1. Breed type.
2. Plumage color.

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3. Freedom from defects and standard disqualifications.
4. Rate of growth.
5. Rate of feathering.
6. Body weight.
7. Quality as a meat bird at different periods of development —broiler, fryer, roaster and fowl.

Some of these characters are highly hereditary and a flock can be greatly improved through rigid selection on the basis of physical characters. *Satisfactory selection for rate of growth, rate of feathering, and quality as a meat bird at different periods of development cannot be made at five or six months of age or later.* Selection must be a continuous process, or made at certain rather definite periods in the life of the bird.

The initial selection of the breeding cockerels should be made at 10 days of age for all of the more popular breeds, other than Leghorns. The purpose of this selection is to mark the fast-feathering chicks, those with the "whisk broom" tails and well developed primary and secondary wing feathers. Slow-feathering chicks at 10 days of age will have no tail feathers.

Leghorns are excepted because they, and other Mediterranean breeds, are pure for fast-feathering. Some strains of New Hampshires also are practically pure for fast-feathering.

The fast-feathering chicks may be marked by slitting the web between two of the toes with a razor blade or sharp knife. Due to the way in which fast-feathering is inherited, more females than males will have the character. In some flocks, when selection is first begun, it will be disappointing to find that there are no fast-feathering males.

A very satisfactory time to make the second selection is at approximately eight weeks of age. At this time all the cockerels should be examined carefully by handling. The ones to keep as prospective breeding cockerels are as follows:

1. Those with a split web between the toes showing that they were fast-feathering at 10 days of age.
2. Those that are feathered the most completely.
3. Those that are heaviest. (A rapid growing cockeral uses feed more efficiently than a slow growing one.)
4. Those with a plump, straight, well developed breast free from blisters.
5. Those that are of good breed type and plumage color and free from breed and varietal defects and disqualifications.

Obviously it will not always be possible to find in the flock a sufficient number of cockerels that have all these desirable characters. It is a matter of choosing, in so far as possible, the best available birds, taking all factors into consideration.

The number of cockerels selected at eight weeks of age should be at least twice the number required for breeders. This will allow for a further selection as the birds develop, and another by the hatcheryman or flock-selecting agent in the fall when those finally retained as breeders are officially legbanded.

Cockerels selected as prospective breeders at eight weeks of age should be marked for ready identification or immediately segregated from the market birds. Several methods of marking have been used successfully, such as placing a small hog ring in the web of the wing, legbanding with special leg bands, or by wingbanding.

Early cockeral selection is by no means a complete breeding program. It is a very practical means of improving the general quality of poultry, particularly with respect to efficiency in meat production. It is only through pedigree breeding and family selection, however, that the most efficient poultry can be produced.

New Methods Insure Alfalfa Success in the South

Condensed from The Progressive Farmer

ALFALFA is now being grown on an increasing number of farms in the northern half of Georgia and Alabama. Experiment station research in recent years has shown that if we use specified amounts of potash and boron, in addition to following other requirements known for many years, failures can be practically eliminated. The new methods offer two to four tons of the highest quality hay per acre per year for four to six years, for $4 to $10 per ton plus the cost of mowing and storage.

Now is the time to make plans for plantings this fall or next. Only good land thoroughly prepared should go into alfalfa and no man should try it unless he follows carefully all instructions. For Georgia, the State Experiment Station recommends:

"Broadcast two tons of ground limestone and 10 to 20 tons of barnyard manure per acre several months before seeding. Apply at the same time or a little later, 500 to 600 pounds per acre of 16 to 20 percent superphosphate. After preparing a thorough seedbed, drill in 20 to 30 pounds per acre of inoculated Kansas Common seed. A cultipacker or a roller of some kind is a useful implement to firm the seedbed before and after planting. Early October seeding is thought best. In February top-dress the alfalfa with 150 pounds muriate of potash and 10 pounds borax and repeat annually. Phosphate and limestone probably should be repeated in three or four years, using about one-half the initial applications. If the fall seeding is a failure due to dry weather or other causes, reseed in late February or early March.

For the Sand Mountain area of North Alabama, the Experiment Station at Crossville has prescribed a crop of well fertilized hairy vetch in cotton middles the year preceding the planting of alfalfa. The vetch is plowed under deeply, and then—

"After each rain or as often as weeds appear during the summer, cultivate the area with a disk or peg-tooth harrow.

"As soon after turning the vetch as possible, apply two tons

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of finely ground limestone per acre and disk in. About Aug. 1, work in a mixture of 600 pounds superphosphate, 200 pounds muriate of potash, and 30 pounds borax. On Aug. 15, plant 25 pounds per acre of *thoroughly inoculated* Kansas Common seed. A whirl-wind type seeder is used, turned rather slowly. Cross-seed, going over field at least twice, to get good distribution. Cover seed promptly with a peg-tooth harrow or cultipacker.

"As soon as the first crop of hay is removed the following May or early June, thoroughly scratch the stubble with a peg-tooth harrow, the teeth being set almost straight to destroy weeds and grass. This cultivation is done after each cutting.

"Following the first cutting each spring, and before harrowing, apply 300 pounds superphosphate, 200 pounds muriate of potash, and 15 pounds borax."

Recommendations for other sections of Alabama vary slightly from Sand Mountain methods.

Nutrition and Health

Condensed from Organic Gardening

Sir Albert Howard

C. I. E., M. A.

If we look at the history of England with a fresh eye and consider it from the point of view of soil fertility, some interesting facts emerge which, I think, bear not only on the origin, but also on the prevention, of disease.

The governing event in the history of our country is the Saxon Conquest. England made a fresh start; an agricultural unit—the manor—was slowly developed which, for purposes of taxation, was later on transformed by the Normans into a rigid feudal system. The main features of manorial farming were two: (1) the open-field strip method of tillage which always included the fallow, and (2) the use of the heavy soil-inverting plough drawn by several pairs of oxen. The Saxons started with a fertile surface soil containing abundant supplies of humus left by the recently cleared forest, and with a sub-soil which had been broken up in all directions by the roots of trees. The mould board plough enabled them to convert these reserves into wheat and other grains. To maintain the yield, however, it would have been necessary to replenish the supply of humus and to restore from time to time the aeration of the lower layers of soil. But both of these essentials were neglected. The volume of manure was small, because there were no root crops for wintering the livestock, large numbers of which had to be slaughtered and salted down every autumn; what supplies were available had to be applied in large part to the lord's demesne: the open fields were never grassed down, when they could have had a rest and built up stocks of humus under the turf. An effective system of sub-soil drainage did not exist: the sub-soiler had not been invented. The inevitable consequence was the slow wearing out of the surface soil as the gap between the fertility used up and that restored widened, and as the permeability of the sub-soil was gradually lost. The result was, the yield of crops like wheat slowly fell. Some time before the Black Death the old records show that it had reached some six

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bushels to the acre. That these diminishing yields were accompanied by a deterioration in the quality of the grain is suggested by the frequent outbreaks of rural unrest and by the growing toll of disease in crops, live stock, and mankind. Under a cast-iron regime like the Feudal System and a method of farming which allowed no latitude, the innovator and the experimentalist were automatically deprived of that freedom essential for progress to take place. Stagnation was the inevitable result.

Where mankind failed, Nature, in 1348-49 and succeeding years, provided a remedy in the shape of the Black Death which, by destroying two-thirds of the rural population, accelerated the decay of the manorial system and stimulated the enclosure movement. The worn out arable was laid down to grass to nourish the flocks of sheep whose wool was in such great demand in Flanders and Italy. Under grass the land slowly recovered, and after a century or so had accumulated sufficient humus under the turf, so that the yield of wheat increased to eighteen bushels to the acre, or even more when these rested areas once again came under the plough. Epidemic disease at the same time diminished in intensity and tended to be restricted to the towns. The slow restoration of soil fertility which took place after the Black Death was followed by some interesting developments in the intellectual domain, as is shown by the achievements of the Tudor period. The restoration of the fertility of the open fields of the manors produced in due course some outstanding men and women—the soil's most important crop.

The restoration of fertility continued after the Tudor times till the Great Depression of 1879. During this period British farming produced many notable pioneers, including Robert Bakewell, Coke of Norfolk, and Turnip Townshend, whose labours were embodied in the Norfolk four-course system, by which the fertility of the soils of this island reached their highest level.

But while the Black Death helped to restore our agriculture, it also sowed the seeds of a calamity which, although slow and insidious in its manifestations, is likely to prove one of our greatest afflictions. The dispossessed craftsmen maintained formerly by the manors lost their employment and were driven to the towns, where they began to start industries which, in the course of years, became an avalanche in the shape of the Industrial Revolution. The workers of the growing factories had to be fed: their machines needed more and more raw materials: the strain on the

land increased. All this development was purely parasitic. The land fed the towns, but the towns did little or nothing to return their wastes to the soil which nourished them. Eventually the land was unable to meet the urban demands and a gap was developed, which was met by the importation of food and raw materials from overseas. Prices fell and the farmers were hard put to it to survive. Science was then called in to stimulate production and the artificial manure industry was born, which has now grown into a vast and powerful cartel-like organization and is now linked up with the production of poison sprays to protect the crops, and every kind of dope to assist live stock and mankind to escape the consequences of a malnutrition which need never have developed. While all this was in progress, the virgin lands of the New World and elsewhere, which produce our cheap food, were being one after another worn out and converted into dust bowls. The Industrial Revolution became a boomerang.

If a connection exists between the condition of the soil, the behaviour of crops and live stock, and the welfare of mankind, surely there must be some principle running through the whole cycle which furnishes a simple explanation of the facts. Such a thread appears to exist. It is, I think, to be found in the condition of the proteins which everywhere are the regulators of infection. If anything untoward happens to the proteins, either in the way they are synthesised or as a result of extreme climatic conditions, then we must expect disease. It would naturally follow from this that there is only one basic disease in the world which, however, will manifest itself in many different ways according to circumstances. It seems so. We can prevent much of this disease by seeing to it that our soils are fertile. Other groups of disease caused by the disruptive effect on the proteins of extreme climatic conditions cannot always be controlled.

It would follow therefore, that there will always be some disease, however fertile the soil may be. All we can do is to reduce it at the source by the faithful adoption of Nature's law of return. This, in brief, is the view of one of our pioneers in medical research—Mr. J. E. R. McDonagh. My own experience of disease, which covers a period of nearly fifty years spent in research all over the world, supports Mr. McDonagh's thesis.

Has all this been confirmed? It has. Case after case has been reported where the adoption of the law of return has been followed by an almost instant response in the shape of disease resistance in

crops, animals, and mankind. The world unfortunately also supplies many examples of the harm which results from the replacement of humus by the manure bag.

In the interpretation of Nature's verdict between crops grown by organic and inorganic methods two important agents, hitherto unused, are doing yeoman service. The instinct of our live stock can instantly distinguish quality in their food: the lowly earthworm is turning out to be the perfect soil analyst.

Brown Hay

Condensed from Hoard's Dairyman

G. Bohstedt

WHEN a hay crop is put up too wet to make good hay or too dry to make good silage, it may turn out "brown hay," if not black or charred hay. The term "charred" suggests that if the heating process had gone farther, there might have been a barn fire due to spontaneous combustion.

Much of the feed value is lost during the period of extremely hot storage. This means that the sugar or starch, the vitamins and proteins, if not destroyed outright, have been greatly reduced in amount. Only the more resistant nutrients, the minerals and the fiber, can stand up against the destructive high temperature. As a matter of fact, these are about the only ingredients that are found in brown hay in larger amounts than in normal green hay.

In some European work years ago it was found that the digestible protein in normal green hay was 10.8 per cent, in light brown hay 10.0 per cent, in medium brown hay 9.1 per cent, in dark brown hay 0.4 per cent, in black hay 0.0 per cent. Digestible protein was therefore lost in direct proportion to the color of the hay.

A recent report from Kansas indicates that their findings are quite similar to the above. They found that the protein of normal alfalfa hay was 67 per cent digestible, of brown hay 16 per cent, and of black hay 3 per cent. With an assumed original total crude protein content of 15 per cent, this variable digestibility would result in 10.0, 2.4, and 0.4

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per cent digestible protein, respectively, for the different batches of hay.

While brown hay often is palatable for cows, at least when they don't have to eat it too exclusively or for too long a time, the Kansas workers observed that cows tired of brown hay. For every 1,000 pounds of live weight the cows on normal hay consumed 20 pounds of it daily, those on brown hay 15 pounds, and on black hay 10 pounds. When thus confined to hay and water only, the cows on the badly discolored hay lost weight, also produced very dark manure, and became severely constipated. They became uneasy and appeared to crave something. These conditions were largely prevented when silage and grain were fed in addition to the hay. Cows on normal hay maintained their live weight.

Such experiences and tests indicate that if brown hay needs to be fed, it should be fed in only limited amounts, preferably not at all to valuable breeding animals or to young stock, unless such animals are running on pasture. Brown hay has had its essential vitamins cooked out of it and the animals soon show symptoms of such a deficiency by their unthriftiness or poor breeding performance.

Screwworm

Condensed from Polled Hereford Magazine

DURING the past season cattle in the Southern one-third of the United States have suffered from extreme Screwworm infestation. This was especially true in the Southeastern States, and particularly in Alabama, Georgia, Florida, parts of Mississippi and Louisiana. Lesser but also severe, infestations were discovered in Tennessee, the Carolinas, Virginia, West Virginia and Kentucky—not to mention the Southwest. Additionally, a great many areas, heretofore never exposed to the attack of Screwworm damage, suddenly found the pest well entrenched and cattlemen not knowing exactly what the trouble was. Parts of Tennessee and Kentucky, for instance, found Screwworm in cattle and other stock and did not know what the identity of the malady was and death occurred often. The infestation is caused

by a small fly known technically as Cochliomyia americana C. and P. When a calf is dropped, the mother hardly has administered the first cleaning before Cochliomyia has deposited enough eggs about the raw navel to cause infestation of an entire herd. The attack is phenominal, and the results deadly. Unless expert and adequate attention is administered, calves die not long after the eggs hatch out their maggots and the maggots (Screwworms) begin gnawing, thus sapping vitality and instituting infection.

There are two prime factors which must be adopted if Screwworm infestation is to be held at a minimum. First is medication; second is management. Faithful examination of the herd daily is a necessary requirement, if medication is to accomplish any good results. The "stitch in time" formula applies rigidly to Screwworm control, for it is simple logic to assume that if the maggots are destroyed as soon as they appear (or the eggs if you spot them) damage will be slight.

The Screwworm produces an estimated loss to the livestock industry of $10,000,000 annually. Such a loss, and such a threat to the industry, certainly invites the most faithful attention to the possible riddance of the pest.

For a number of years there has been a great need among owners of large numbers of domestic animals in the Screwworm-infested area of the United States for an efficient remedy which combines materials that will kill Screwworms infesting wounds and protect susceptible animal tissues against infestation. Previous recommendations by the Department of Agriculture have required the use of one material to kill the maggots in the wound and a second to prevent reinfestation. Where large numbers of animals are to be treated, this method is time-consuming and leads to carelessness which results in failure to kill all the worms.

Research by the Bureau of Entomology and Plant Quarantine during 1940 and 1941 has developed a remedy which, when applied to infested wounds, is efficient in rapidly killing all Screwworms in a wound. At the same time this remedy gives as good protection to all wounds against subsequent attack as materials heretofore recommended for this purpose, or even better protection.

The remedy is relatively inexpensive and consists of a correct compounding of the two principal materials at present advocated by the Department for the treatment and prevention of Screwworm cases.

This remedy has not been tested throughout the Screwworm-infested area of the United States, but experiments conducted

in Texas indicate that it can be used generally throughout the Southwest.

Research is under way on a number of different materials and formulas that show promise in Screwworm control; however, experimental results with the mixture described herein have been so satisfactory that it has been decided to give this formula to the public and in the future to make such changes in the recommendations as results may warrant.

The remedy known as Formula (or Smear) No. 62 is composed of the following ingredients:

Diphenylamine (technical grade), 3½ parts by weight.

Benzol (commercial), 3½ parts by weight.

Turkey red oil (pH-10 or neutral), 1 part by weight.

Lamp black, 2 parts.

The diphenylamine is dissolved in the benzol, preferably by placing the two substances together and allowing them to stand 12 or 24 hours. In no event should the dissolving of the diphenylamine in benzol be attempted by heating over an open flame. Benzol is highly flammable and should be kept away from flames and lighted cigarettes or cigars. If heat is used to hasten solution, the container holding the benzol and diphenylamine may be placed in a vessel of hot water, the benzol container being left uncorked until the diphenylamine is dissolved.

After the diphenylamine is dissolved the turkey red oil is added and the mixture thoroughly shaken. The lamp black is then stirred in gradually and the mixing continued until the compound attains a smooth, even texture of about the consistency of molasses. It is then ready for use. The remedy is best applied with a 1-inch paint brush.

In treating animals infested with Screwworm, the material is swabbed into the wound, care being taken that it is pushed well into all the pockets made by the maggots and painted around the wound where blood and wound exudate have made the surrounding tissue attractive to flies and susceptible to infestation of fly blows.

It is not necessary to remove the dead worms from the wound, but most of the larger dead worms may be picked or wiped out with the brush if desired. If the worms are removed the wound should be treated again with the smear before the animal is released.

For protecting uninfested wounds, such as those caused by shear cuts, castrations, dehorning, and docking, it is sufficient to cover the raw tissues and surrounding area thoroughly with a coating of the smear. In treating castration wounds some of the

material should be pushed slightly into the openings of both sides of the scrotum.

This remedy kills Screwworms quickly, and after its application large numbers of them soon drop out of the wound, carrying a considerable amount of the protective chemical with them. For this reason it is a good practice to apply a second treatment from 24 to 48 hours after the first one to insure a proper coating of the wound surface. Thereafter under average conditions, regular treatments twice each week should be given until the wound is (completely) healed. It is especially recommended that infested animals be kept in a hospital pasture when this schedule of treatment is followed. When flies are unusually active and abundant more frequent treatments may be necessary.

This solution should be kept tightly sealed when not in use.

The primary Screwworm fly has four stages in its life cycle; these are the egg, the larva or Screwworm, the pupa, and the adult fly. The adult female cements the mass of eggs to the edge of a wound or to the soiled skin below the wound. These hatch in 11 to 21 hours, and the young Screwworms invade the wound, feeding close together and forming a pocket in the living flesh. They do not crawl over one another like ordinary blowfly maggots but feed with the pointed or head end downward and with the tail or blunt end exposed for breathing. The Screwworm becomes fully developed within four to 10 days, crawls out of the wound, drops to the soil, conceals itself near the surface of the ground, and changes to the pupa or resting stage. This stage usually lasts about seven days. It may last nearly two months during the winter, when the average daily temperatures of the air are approximately 54 degrees F. If the average daily temperatures are lower than 54 degrees and such temperatures prevail for longer periods, they cause the death of the pupas in the soil. When the flies emerge from the pupa cases they mate, and within five to 10 days the females are ready to lay eggs. During the warmer months of the year the total cycle may be as short as 18 days, but it usually averages about 24 days.

Before an animal can become infested with Screwworms it must have an injury on which the Screwworm fly can lay its eggs. This may be a large wound or merely a small abrasion. The cause of the common injuries are readily recognized, and they suggest that different methods of handling or of managing animals can effectively eliminate infestations of injuries of these types.

Infestations are likely to oc-

cur in the navels of young animals immediately after they are born. Such cases can be prevented if the breeding program permits the young to be born when Screwworm flies are not present or are least active. In southern areas, where the pest is active throughout the year, it is necessary to give special attention to prospective mothers and their young. This also applies to cows in dairies where it is necessary to freshen the cows by having calves born at different times of the year; to sheep if lambs are raised to meet seasonal demands, and to autumn litters of pigs. A few days before the arrival of the young the dams should be placed in a convenient holding pasture and treated with a light application of pine-tar oil (dehydrated, specific gravity 1.065) about the vulva. After the young are born the mothers should receive an additional treatment, and the navel cords of each of the young should be tied off about one to two inches below the belly and the lower portion cut off with a knife. If tincture of iodine is applied to the remaining portion of the cord, it will aid in drying it. A light application of pine-tar oil should be applied on the belly around the navel to repel the Screwworm flies.

The End of the Boxwood Leaf Miner

Condensed from Flower Grower

Louis Pyenson

N. Y. State Institute of Agriculture, Farmingdale, L. I.

For years boxwood lovers have struggled valiantly to protect this valuable ornamental from the persistent attacks of the boxwood leaf miner. Each year they have watched for the appearance of the adult flies, mixed up a messy molasses-nicotine spray, and coated the boxwood foilage with it once, twice, three times, and even four times at three or four-day intervals. When rains washed the sprays off, repeat applications had to be made. Some boxwood growers even draped the plants with unsightly covers to keep the spray materials from washing off during rains.

This yearly drudgery helped keep the pests down but never eliminated them, for it takes only a small number of early or late emerging adults to start a reinfestation. In addition adult leaf miners have only to be on the loose for a few hours before they start laying eggs. Shortages of labor and spray materials have helped build up tremendous leaf miner populations these last few years. As a result of this neglect, shabby looking boxwoods that are the despair of gardeners are common.

Now a truly remarkable eradicating agent has been found which promises to reduce the boxwood leaf miner to a mere memory. Experiments conducted on the grounds of the N. Y. State Institute of Agriculture have shown that one spray with this insecticide, properly timed and applied, has the power to eliminate every leaf miner which emerges, even though emergence may stretch over a three-week period or more.

The insecticide that does the trick is the much publicized DDT, which has the remarkable power of destroying some insects when they merely touch it with their feet even weeks and in some cases months after it is applied. That is the secret of DDT's amazing effectiveness on the mosquito-like adult miners who must rest on the sprayed leaves for some time before they are capable of flight, and as a consequence are doomed to a slow but certain death. Even

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though some leaf miners may emerge on leaves missed by the spray, they must soon come in contact with sprayed leaves and destroy themselves.

Two forms of DDT were found effective — the water miscible powdered form containing from 20 to 50 per cent actual DDT, depending on the company manufacturing it; and the dissolved-in-miscible-oil form, which contains 20 per cent by weight of DDT. The powdered form may require a good sticker-spreader and has the disadvantage of leaving a visible residue on the foliage. The miscible oil form is preferable, as it leaves no visible residue and may stand more weathering.

The dosage of the powdered form varies with the DDT content. One pound of actual DDT should be used with each 100 gallons of water. This mean 2½ pounds of DDT powder per 100 gallons of water if its actual strength is 40 per cent DDT; or 4 pounds per 100 gallons of water if its strength is 25 per cent DDT. Twice this recommended dosage does not injure the boxwood and leaves a residue that is effective for a period of over one and one-half months in spite of heavy rains. In a trial two heavily infested boxwoods were sprayed with this powdered form at the rate of 2 pounds of actual DDT per 100 gallons of water plus a sticker-spreader three weeks before any boxwood leaf miner emergence occurred. All the adult miners emerging over a period of three weeks were killed on these plants. This shows that accurate timing of the application is unimportant as long as it is made a week or less before any emergence has taken place.

The best procedure is to apply the spray as soon as the head ends of the pupae in the leaves begin to darken. This can be detected by careful periodic examination and generally occurs the first or second week in May in the latitude of Long Island. These observations on the pupae should always be taken on plants on the south or southwest side of buildings or wind breaks, as adult emergence in such locations may begin a week earlier than in exposed places.

The miscible oil form of DDT known as Gesarol Emulsion was used at strengths of 1 gallon to 100 gallons of water and 1 gallon to 400 gallons of water. There was no injury to the foilage and the same complete kill was accomplished even with the more dilute dosage during the entire emergence period, although several heavy rains fell during that time. Since the dilute 1 to 400 dosage did not seem to have as rapid a killing effect as the strong 1 to 100 dosage, it seems best to recommend an intermediate 1 to

200 dosage. It is important to emulsify the miscible oil thoroughly before spraying.

It must be emphasized that the application of the DDT spray must be made before any emergence occurs, and must be thorough, so that both sides of the foliage are covered, to obtain the complete destruction of the leaf miners. The use of a power sprayer, and spraying the bushes from the inside as well as from the outside, will help.

There is only one dark cloud to this happy picture. There appears to be a tendency for the boxwood mite to build up to injurious numbers because of the use of DDT, which is evidently effective against the parasites and predators of the mites but not against the mites themselves. However, boxwood mites can be easily overcome by dusting with sulphur or spraying with a summer oil.

Why Some Cows Can Never Be Profitable

Condensed from Checkerboard News

GLANDS, which are never seen and which we seldom think about, exert a powerful influence on the bodies of all warm-blooded creatures.

Dr. W. E. Petersen of the University of Minnesota, one of the outstanding dairy research men of this continent, has recently demonstrated that the improper functioning of one small gland can make a good-looking, well-bred dairy-type cow commercially worthless—or at least unprofitable as a milk producer. His discovery may serve to answer the question in dairymen's minds as to why two cows that are closely related may be very different in milk-making capacity.

This gland is the pituitary gland, and one of its functions is to secrete and release into the blood stream a substance (hormone) called prolactin. This hormone is released into the blood stream at calving time, and continues to be secreted and released by the gland throughout the whole lactation period. As long as there is plenty of prolactin in the blood, a well-bred cow that has a good udder and is well fed, will produce a satisfactory yield of milk. But if the secretion of prolactin is insufficient, she soon becomes a stripper or may dry off completely.

Dr. Petersen has demonstrated in an unusual but very con-

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vincing way, that this glandular secretion (prolactin) is the stuff that actually prods a cow's udder into action. He discovered a way by which he could stimulate the action of a cow's pituitary gland artificially, by a hypodermic injection, and produce the same secretion of prolactin that would ordinarily occur at calving time. Then he gave a series of these hypodermic injections to a heifer that had never been bred.

Remember, this was not a case of artificial insemination. It was a straight injection of a synthetic hormone directly into the heifer's blood stream. The heifer did not conceive a calf or go through any period of pregnancy, yet within a short time her udder developed and she produced 15 pounds of 6 per cent milk per day.

Dr. Petersen doesn't claim that there is any practical value to a dairyman in this experiment. It is one of those experiments which is conducted for the sake of "pure science"—to find out just what the actual facts are. The practical value comes later, when the facts that are thus discovered, are applied to everyday problems.

This experiment with the unbred heifer proved one thing only—that the act of making milk is not caused by "mother's instinct," or a cow's conscious desire to feed her calf, or by the kind of feed the cow eats, but it is an involuntary act which is caused by the presence of prolactin in the blood stream.

Obviously, there must be milk-making material in the blood stream also, from which milk can be made. And when the blood carries the right blend or balance of milk-making materials, the cow will make more milk than when the milk-making materials are not well balanced. That's where feeding comes in. These experiments were all made with animals that were being adequately fed.

Dr. Petersen's next step was to find out how the *amount* of prolactin in the blood stream affects the milk yield. That is, to find out whether a little prolactin is as good as a lot, or whether it might be possible that some cows may be poor producers simply because their secretion of prolactin is too small.

He selected a cow that was well bred, and had a well developed udder, and was well fed, but was a low producer. There was no outward reason to explain why she was not a profitable cow, but she simply wasn't. But when he gave her the hypodermic injections to increase the secretion of prolactin (in the same way that he treated the unbred heifer) her milk yield increased very markedly. In other words, when she had extra prolactin in her blood

stream, she put extra milk into the pail.

When it comes to the practical application of all this, Dr. Petersen's comment is very much to the point.

"You can't run around injecting hormones into cows at every milking," he says, "so if a cow has been fed properly, but still does not give enough milk, the best solution is the butcher shop."

Certainly, that pithy sentence boils down and delivers the meat of it in a nutshell. But perhaps a little further discussion might be permitted.

In the first place there is no way of knowing how many cows are handicapped by too little secretion of prolactin. It is not the first thing to suspect when you are trying to size up the reasons for a cow's failure to yield a profitable milk flow. She may have freshened in poor condition due to inadequate feeding during her dry period. Or she may not have received a proper balance of milk-making ingredients in her milking ration. Or she may have been forced to stand for some minutes at each milking, after she was ready to let down her milk, before milking was actually done. Or she may have been handled roughly, or frightened or irritated at milking time.

But if all the cows in a herd have been "fed properly," as Dr. Petersen says—and that means properly fed during the dry period as well as properly fed after calving—and if they have been well handled at milking time, and if there are two or three cows which fail to respond with satisfactory milk yields, then it is fair to suspect that those cows have too little prolactin in their blood and can never be profitable as dairy animals.

It would also seem to be sound judgment to watch the daughters of such cows very carefully. While Dr. Petersen does not say that this glandular deficiency is hereditary, it is quite conceivable that the tendency might be passed on from mother to daughter.

To pursue this thought a step further, the knowledge that glandular deficiency does retard milk production, and the possibility that the tendency may be hereditary, make very convincing reasons for examining the milk records behind any new bull that is being brought in to head the herd. The best looking bull in the world might cause infinite harm, if he were to transmit this hidden fault to his daughters. The surest safeguard would be to study the production records of his dam, grandam, and sisters.

Organized Hybridizing of Laying Strains

Condensed from Canadian Poultry Review

John H. Vondell

To the uninitiated there appears to be a certain glamor in trap-nesting. How wonderful it would be to know that hen No. 111 laid 27 eggs last month, and her record to date is 176 eggs. Lots of people think that success in poultry keeping demands a knowledge of each bird's record. Merely trapnesting and recording production is a small part of a breeding program. The specialized breeder spends hours analyzing family records and delves into books on genetics. Obviously, he must be a specialist by training, temperament, fortitude, and finances. Very few people answer these requirements.

How, then, can a man maintain a high level flock of layers year after year? One answer is to let someone else do the breeding work and buy chicks each year. But supposing he maintains a large flock and runs a hatching business. He wants to sell chicks that lay, live, and pay off well in any form. One safe way is to adopt an organized round robin crossing of about three or four similarly bred strains of his breed. This may not be easy with some breeds, but it certainly would with Reds, New Hampshires, Barred Rocks, or White Leghorns.

It was back in 1930 that Professor J. C. Graham, then head of the poultry department at Massachusetts State College inaugurated his "Poultry Flock Improvement" project. The plan was to select three or four breeding sources where similar programs were in effect and purchase hatching eggs from one each year. The new cockerels would be crossed on the crossed strains. Thus, cockerels from strain 2 would be mated to strain 1. Next year, cockerels from strain 3 would be mated with pullets of the strains 1 x 2 combination. Then, if 3 strains were to be used, he would go back and mate cockerels from strain 1 on the 1 x 2 x 3 combination, and proceed as formerly.

The plan worked well and I remember how Professor Graham used to gloat over his high weekly hatches and pen laying records. Hybridizing was the answer.

But this form of hybridizing was different from crossing radically unsimilar forms, like breeds. Continuous crossing of breeds

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swiftly leads to an unorganized chaos of colors—and everything else. So to be specific, the strains to be used had to be quite similar in color and have the same type of breeding program back of them. The factors stressed were early maturity, non-broodiness, intensity, long persistency of production, good size egg. To select a strain bred for exhibition, another for meat qualities, and another for high egg production would be folly. The results would be extremely uneven within the flock, and also from year to year.

In purchasing hatching eggs, Professor Graham asked for 27-ounce hen eggs from trapped flock matings. Thus, a check was kept on the product from the start. About 70 hatching eggs were bought for each 100 birds to be mated the following season. The 70 eggs would easily produce the necessary 7 to 10 males and leave plenty after the selection. The sisters were kept in a different flock and not mated.

The plan in use follows:

First year:

(a) Purchase hatching eggs or chicks, enough for a starting unit. These should be bought from a reliable breeder whose stock has all the desired factors and shall be known on the chart as "A." At the same time purchase enough chicks or eggs from "B" to provide sufficient cockerels to mate to "A" pullets in the spring. Mark the chicks to preserve identity.

(b) Cull rigidly throughout the growing season and at housing time.

(c) At broiler time reserve as breeders triple number of cockerels needed from "B" selecting for size, complete feathering, and body condition. At maturity these can be culled to twice the number needed for mating. Keep "A" cockerels only to observe growth factors.

(d) House pullets according to age, basing selection upon physical condition, size, and maturity.

(e) At seven months (if Reds or Rocks) segregate those not laying and do not breed from them. This is the limit line for the early maturity factor.

(f) At mating time it might be well to do some regrouping of pullets. The poorer birds and those showing signs of low production should be culled or grouped into a laying pen and only the remaining large, vigorous, high production birds be mated.

(g) Incubate best eggs only, 24 to 27 ounce eggs of good shape, color and texture.

(h) Broody birds should never be left in the breeding pen, but sold or relegated to the laying pen.

(i) Dispose of all cocks at the end of the breeding season.

(j) All the birds to be sold at end of first laying year.

Second year:

(a) Purchase hatching eggs from the third selected strain known as "C," buying about 70 eggs for each 100 birds to be mated.

(b) Slit the toe webs of the chicks so that the birds can be identified at any later date.

(c) Continue to cull at all times. Make the same selections of cockerels and pullets as in the first year.

(d) Segregate the pullets of the third strain into a laying pen.

(e) Mate the third strain cockerels to the pullets raised from the first strain crossed on the second.

Third and Fourth years:

Proceed as in second year, going back to "A," and then "B" sources.

In time it might be desirable to introduce a fourth strain. In all cases where a new strain is considered, the safe plan is to try it out first under one's farm conditions, then try crossing and observe the results. This factor cannot be over-emphasized.

Select Strains Carefully

What can be expected? Of course, a lot will depend upon how carefully the strains are selected. It would be easy to make the selection among the Red breeders in Massachusetts. It would be natural to expect less hybrid vigor in crossing of strains bred along similar lines than in crossing breeds. Professor Graham's results showed an average of 88 per cent hatchability against 80 per cent for a pedigree bred strain of Reds. Body weight and egg size were also heavier in the hybrid flocks.

Similar to Corn Breeding Work

A very similar scheme is used in corn breeding, except the crossing is done from a few pure inbred lines that are kept intact for hybridizing purposes. The plan outlined in this article depends upon purchasing outside instead of trying to maintain several pure, highly bred strains on the farm.

The idea of hybridizing is also well illustrated by its use on a master breeding farm of a large western co-operative chick association. They maintain two pure lines and then make crosses. The resulting offspring, they claim, have much more vigor and live better than the pure families. The pullets have less mortality and there are fewer culls at every stage. Some very strong claims have also been made for increased egg production.

Hybridizing has worked wonders in corn breeding. Most of the broiler raisers prefer hybrid chicks. There appears to be a wonderful field in hybridizing laying strains of similarly bred highly purified lines.

Old and New Fertilizers

Condensed from Seed World

Lee A. Somers

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THE art of fertilizing the soil preceded the science by several centuries. The ancient Babylonians knew that application of animal manures increased plant growth. The ancient Egyptians let their land lie idle every seventh year. The American Indians were planting fish under the hills of corn long before the white man came. Each was practicing the art of fertility but knew nothing at all of its science or why these practices increased plant growth.

When the role of nitrogen in plant growth finally became known, the slaughterhouse by-products, such as dried blood and tankage, came into use. They were difficult to handle, and had an extremely offensive odor. Cottonseed meal was also used as a source of nitrogen and still is used to some degree, but both the packing house by-products and the cottonseed meal are now used as animal foods.

The Chilean nitrate beds had long been known, and in 1830 two bags of the material were shipped to the United States.

The value of potash salts was first demonstrated in 1845 by a German scientist named Liebig. When it was suggested that the phosphorus found in certain rocks might be ground and applied as fertilizer, the idea was first ridiculed and then reluctantly accepted. John Laws patented a process of making superphosphate in 1842. Liebig and Laws may be called the fathers of modern fertilizing, although they never realized what they had done.

The first mixed fertilizer was made in Baltimore in 1850 by dumping quantities of various plant food materials on the floor and shoveling them back and forth until they were well mixed. There was no uniformity in size of particles of the different ingredients; the smaller size particles settled to the bottom of the pile and the mixture was anything but uniform. Moreover, many of the materials used were offensive, and any residue had to be buried under the earth. However, a start had been made in the new industry.

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New sources of materials were found and developed rapidly. Sulphate of ammonia was first produced in 1893. The production of cyanamide was begun in 1910. Synthetic nitrate of soda was first made in 1922. The commercial production of urea began in 1928.

Until 1915 the German beds were the only known source of potash, but in that year the Searles Lake beds in California were found and in 1931 the big beds at Carlsbad, New Mexico.

At the same time or earlier, phosphate deposits were being found. The Carolina beds had been known since 1867. Those in Florida had been known since 1881 but had not been worked, and those in the west had also been known for several years. The big Tennessee deposits that provide most of our phosphate were discovered in 1893 and 1894.

While all this was going on, improvements were being made in the machinery necessary for grinding, mixing and sacking these materials. Thus it is that the gardener can go to any seed house, order any of several formulae and find it completely mixed, well ground and even in texture.

What Mung Beans Are Good For

Condensed from The Farmer-Stockman

OKLAHOMA is in the national limelight as chief producer of mung-beans, the little green bean used to grow sprouts for chop suey, chow mien, and other dishes featured on the menus of Chinese restaurants. A few Oklahoma farmers who "got in on the ground floor" have made good money by growing these beans for the sprouting trade.

Not many men can get rich by growing mungbeans for sprouting. The entire national demand can be supplied on a relatively few acres. But the mungbean need not be just a passing fad, nor merely a profitable specialty crop for a few growers. Tests at the Oklahoma A. & M. College experiment station show it has possibilities both as forage and as a source of home-grown protein feed. It is also a good soil improving crop.

Dr. A. H. Kuhlman, Oklahoma station dairyman who has been a leader in testing mungbeans, calls them a triple-threat crop; human

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food, animal feed, and soil improvement. Some enthusiasts see mungbeans joining with sorghums to provide feed on southwestern farms in the same way that soybeans and corn team up to support the Corn Belt farmer.

Oklahoma station research workers, with usual scientific caution, will not go so far as to predict that mungbeans will become a major crop in the southwest. But they do assert that, at the very least, mungs are a good source of feed in such emergencies as the 1930 drouth years or the recent scarcity of high-protein meals. They point out, too, that mungbeans can be planted late, as a catch crop after other feed crops have failed, and can "take it" in dry years and on upland soils.

In the late 1920's, Dr. H. F. Murphy, now agronomy head at Stillwater, began experimenting with mungbeans as a soil improving crop because they could be planted late, after a grain crop was taken off the land. In 1927, the nutritive value of the beans was shown by Dr. V. G. Heller, Oklahoma station chemist, who found they averaged well over 23 percent protein.

Then Kuhlman and his research teammate, Dr. Willis D. Gallup, agricultural chemist, decided to test the forage value of mungs and had one of those lucky breaks which help relieve the usual monotony of research work. They started their tests in 1934 and carried them through 1937. No one who was farming in Oklahoma in those years needs to be told that mungbeans got a real tryout as a drouth-resister.

Besides proving their ability to produce forage when practically nothing else was green, the mungbeans planted in those years also showed high feed value both as hay and as silage. Kuhlman and Gallup found that 110 to 120 pounds of properly cured mungbean hay could replace 100 pounds of alfalfa hay in a dairy ration. When mungbean silage replaced one half the alfalfa hay in a ration, a pound of dry matter in mungbean silage was worth as much as a pound of dry matter in No. 1 alfalfa hay.

The higher feeding value in the form of silage is explained by less loss of leaves and by greater use of the course stems which cows often refuse when eating mungbean hay.

Excellent silage was obtained in all four years without using any of the preservatives usually found necessary with legumes. A possible explanation, Kuhlman says, is that the mungbeans contained no excess moisture when they were cut.

Despite these results, interest in mungbeans lagged until Japan invaded China. Bean sprouters in this country suddenly found

their supply of seed from China cut off, and turned to Oklahoma as one of the few states where mungbeans could be obtained. The rapidly increased production of mungbeans to meet this demand resulted in the accumulation of cracked beans, useless for the sprouting trade. Station animal husbandmen and poultrymen, remembering Dr. Heller's analyses, started a series of feeding trials using the cracked beans.

Dr. Robert Penquite used ground mungbeans successfully for as much as 40 percent of both growing and laying mashes for chickens, as long as he used 5 percent meat and bone scraps and 2 percent bonemeal in the mash to provide mineral elements. R. B. Thompson, A. & M. poultry department head, figures a half acre of mungbeans will produce enough to grow 100 pullets to laying age, using 25 percent of ground beans in the growing mash.

Dr. Carl P. Thompson and J. C. Hillier used coarsely ground mungbeans to replace the cottonseed meal in a standard swine protein supplement of meal, meat scraps and dehydrated alfalfa and got good gains; but a ration in which the bean meal replaced both cottonseed meal and meat scraps did not work. Apparently the mungbeans need some mineral supplement.

For turkeys, Dr. T. T. Milby found ground mungbeans satisfactory for supplying up to two-thirds of the protein usually supplied by cottonseed or soybean meal, in both starter and growing mashes.

Lambs were fattened by Dr. Hilton Briggs on a ration in which cracked mungbeans replaced about one-half to two-thirds of the cottonseed meal. The lambs found the beans unpalatable beyond .35 pound per head daily.

Mungbeans as replacement for high-protein meal in dairy cow rations are now being tested by the research team of Kuhlman and Gallup. These are the men, incidentally, who contributed so much to Southern dairying by showing that cottonseed meal can be fed to cows in unlimited quantities as long as the animals get plenty of vitamin A, and who then went on to show that a good grade of Oklahoma prairie hay has enough of this vitamin to do the job.

Science in British Agriculture

L. F. Easterbrook

It is no exaggeration to say that Britain is the pioneer of agricultural research. In the 18th and 19th centuries, when so much progress was made in the management of soil and crops, in the development of livestock and the invention of new farming machinery, it was Britain that took the lead. So it is that the world's oldest agricultural experimental station is in England—the famous Rothamsted, which is now over a hundred years old. Of the twenty breeds of cattle, sheep, pigs and horses of world-wide reputation, all but three originated in Britain. An Englishman, James Smith, designed the first reaper, 1815, followed by Patrick Bell, a Scot; another Englishman, Jethro Tull, had by that time already invented the first seed drill. It is not surprising therefore, that throughout those years Britain was the place to which men of every nation turned when they wanted to see the latest things in farming, and good husbandry at its best.

Originally this impulse to seek more knowledge about the land and all that it brings forth sprang from a genuine love of the soil and animals that was common to many of the 18th century landowners in Britain. They lived on, by and for their estates. They turned such humdrum affairs as the annual sheep shearings into festivals of agricultural education, They improved their land by fertilizing the soil and by enforcing upon their tenants farming systems that were designed to keep the soil permanently fertile. It is in no small measure due to them that Britain to this day has no problem of soil erosion. When they improved the livestock of their day and fixed breed and type, they worked not for personal glory, but out of their genuine interest in animals and agriculture, seeking to create for humanity at large reliable breeds that would serve better the day-to-day purposes of livestock farming. When Patrick Bell, a Scottish farmer's son, cut the first grain ever to be reaped by a machine, he refused to take out a patent for it lest that should put off the day when reapers would be in common use. For this reason he died a comparatively poor man instead of a rich one.

The story of the Rothamsted agricultural research station is

typical of those days. Sir John Lawes, born in 1814, succeeded to a family estate as a schoolboy. At the age of twenty-six he began applying his aptitude for chemical experiments to growing plants. He worked to the year of his death (1900) in close association with J. H. Gilbert, a fellow student, studying both chemical fertilizers and animal nutrition. When Lawes died, he endowed his Rothamsted estate with £100,000 ($400,000) to make it a national research station. Thus the world gained its first detailed knowledge of fertilizers, and also its first agricultural research station.

It is interesting to note that the same spirit exists in Britain today among thousands of landowners and farmers. Some compete in breeding pedigree stock for the sheer love of the thing, and others, farming perhaps only a few score acres, are experimenting on their own in problems of cropping, soil improvement and even in new mechanical inventions. In fact, in recent years some of the most successful developments have come, not from the scientists or the engineers, but from ordinary farmers, farming for a living. It is significant that in all the talk about closer control and supervision of agriculture in the future, one of the points that farmers insist upon most strongly is that such control must leave them scope to make their own experiments and to learn from their own mistakes.

That is the background. But it is obvious that any living dynamic industry such as agriculture must change with the times, and so the picture of agricultural research changes too. Agriculture in Britain, is in the middle of a change at this time; agricultural education is being woven more closely into a national educational system, and the services for providing technical advice to farmers are to be administered by a National Advisory Service in place of the local bodies which hitherto had been the farmer's sources of information.

In Britain, the State has for some years been spending about $2,800,000 a year upon agricultural research. That is now to be increased. The joint report of a committee including members of both houses of parliament has suggested that it might be profitably increased to at least $12,000,000 a year.

Agricultural research in Britain is at present carried out in about fifty institutions. All, in varying degrees, obtain grants from a Development Fund. These institutions fall into three types: (1) Government stations, directly responsible to, and administered by, the Government; (2) Institutes attached to universities, such as Oxford or Aberystwyth

(Wales); (3) Independent research stations, such as Rothamsted. In addition, there are two Imperial Institutes and nine Imperial Bureaux, providing a scientific service for the whole British Empire. They are supervised by an Executive Council, on which sit representatives of the United Kingdom, each of the Dominions, India, Southern Rhodesia and the Colonial Empire.

There is also an Agricultural Research Council, which is a separate body established under the British Government to promote and co-ordinate scientific research in agriculture. It uses most of the funds devoted to it by Parliament in making special grants, usually for three years, for research into a special problem. The policy is to appoint a group of scientific scientists to plan and supervise co-ordinated trials and experiments at a number of centers. The Council has proved most useful because of the elasticity of its methods and because of the extent to which it can ensure that all aspects of a farming problem are covered, with the minimum of overlapping. It goes a considerable way towards meeting the problem of concentrating scientific research upon a desired objective in certain instances, without putting all scientific research into the straight-jacket of excessive State direction.

Agricultural research is also carried out at the expense of private firms, societies and individuals. But in whatever way the research worker makes his contribution to knowledge, it is quite another thing to get it applied to everyday farming through the ordinary farmer. This is one aspect of the work which all are agreed must receive much more attention as peacetime conditions become re-established. This does not mean that nothing was done before 1939. In almost every county there was a county agricultural organizer and his staff working under the supervision of the County Council. These were the ordinary farmer's guides and advisers, and their services were available free of charge. Any farmer could summon these experts to his farm, seek their help, and, for example, have his soil tested to see if it were deficient in lime. The county organizers were the link between research and the farmer, and their job was to make personal contacts, organize demonstrations, conferences and agricultural shows. Their work during the 1939-45 war has passed largely into the orbit of the County War Agricultural Committees, and now that the war is over this is one of the services that will come under the new National Advisory Service. But the principle of technical experts, who can talk the farmer's language and gain his confidence, ex-

plaining, demonstrating and advising on new knowledge gained by the research worker, has been retained and will be continued.

During the 1939-45 war, the results of agricultural research repaid a thousandfold the money the British Government had spent upon it. Knowledge gained about the use of phosphatic fertilizers alone has saved Britain from crop failures on hundreds of thousands of ploughed up grassland acres, where lack of this knowledge at the time of the 1914–18 war caused widespread failure. Thousands of additional acres of grain were won through knowledge resulting in the defeat of wireworm, and, with better equipment both technically and mechanically, successful crops have been grown all over the country in areas which no one would have dared to plough in 1914-18.

As the world reverts to peacetime systems of farming, for Britain this will mean more emphasis upon livestock husbandry, and she will then be even more deeply in the scientist's debt. For Sir George Stapledon, the great grassland expert, has found and demonstrated how pastures which (it used to be said) required eight years to establish, can be created in a few months; and how, by keeping them down for short periods, then ploughing them up and taking a grain crop or two before seeding them back to new pasture, the stock-carrying capacity of the grass can be doubled. And grass is Britain's most important crop.

Sir George, helped by the caterpillar tractor, has clothed some of the English hilltops with grass where no grass ever grew before, and he has prepared the way to open whole new chapters in rural economy in areas that were mostly waste land before the magic hand of the scientist made the wilderness to blossom. There can be more of the good life, and even a dash of romance, when the scientist and the practical farmer work hand in hand.

Less Time in the Corn Field!

Condensed from Farm Journal

C. R. Elder

How long does it take you to get your corn land ready and planted?

Chances are it's between two and three hours for each acre. That's about average for the plow - disk - harrow - and - plant method.

Roscoe Eliason, of Louisa County, Iowa, does the job in 1¼ hours per acre, yet his short-cuts don't interfere with his 100-bushel corn yields.

Eliason still plows his land, but he's left out the disk-harrow steps. He just pulls his corn planter out on the plowed ground and starts planting. He's even tossed away the wire and stakes, and with them the planting marker.

"I never knew why I hated to plant corn so much until I quit using row markers and planter wire," Eliason says.

He plows carefully, sees that his shares are sharp and the plow properly adjusted. Back of the plow he pulls a rotary hoe or "go-devil," run backward to keep it from clogging.

When planting time comes Eliason mounts his corn cultivator on his tractor and trails a two-row planter. On the front beam he puts a pair of disk hillers, set to overlap each other so they open a trench about four inches deep and eight inches wide. On the back beams he uses duck-foot shovels, two on each beam, to close the trench opened by the disk hillers. He keeps the shovels sharp and well adjusted so they do a good job of ground stirring and weed killing.

The planter, a converted horse-drawn machine, is attached to the hydraulic power lift, so that it runs directly over the furrow which has been opened by the hillers and closed by the shovels.

Another time-saving trick that Eliason uses is plowing and planting on the circle. He starts plowing in the *center* of the field, and goes around and around. The plow is never lifted from the ground. He does the same thing in planting, except that he starts from the outside.

All corn is drilled. In planting, Eliason sights over a marker on the front end of the cultivator. The rows aren't quite as uniform as he would get with a marker, but, as Eliason explains, "I can follow 'em with a tractor without

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any trouble, and I only cultivate once or twice anyway."

He doesn't waste any time cultivating, yet his corn is clean. Just as the corn is breaking through the ground and the weeds are showing white, he goes over it with a spike-tooth harrow. Then when the corn is three or four inches high, it is cultivated with a rotary hoe. When it is knee high he puts ordinary shovels on his cultivator and goes through the fields. If necessary, and it isn't often, he cultivates it a second time.

A New Lespedeza

Climax lespedeza, a selection from Korean, has been outyielding other varieties in eastern and southeastern Oklahoma during the 3 years that it has been on test. It matures later than Korean and gives a longer pasture season. At Stillwater, it led all other varieties in yield of forage with 5,313 pounds of air-dry hay an acre. Korean strains produced approximately 4,000 pounds of hay and Kobe 3,600 pounds. In northeastern Oklahoma, Climax produced 5,783 of air-dry hay an acre to outyield all other varieties.

Sixteen strains of Kobe and 18 strains of Korean were used in the test. In most instances the Kobe strains were somewhat later than those developed from Korean, and forage yields were not as good. However, the Kobe types outyielded the Korean in seed production with an average of 1,000 pounds of seed an acre at Stillwater where the Korean strains produced 700 to 800 pounds an acre.

—Capper's Farmer

Production of Mulch Material

Condensed from American Fruit Grower

J. H. Gourley

Ohio Agricultural Experiment Station

THE USE of mulch about fruit trees as a definite and positive system of culture has gradually grown during the past fifty years until today it is used extensively in many sections of the United States and Canada. It is really a very old practice although it never gained much of a foothold in commercial orchards until it was given special emphasis by F. P. Vergon of Ohio in the 1890s.

The use of small, flat stones about fruit trees was practiced in England in the 1700s and from early times in parts of China. It's another example of a good thing that has taken a long time to take hold.

Its merits and disadvantages have often been proclaimed and our purpose at this time is to call attention to the most serious problems to its use, namely, securing a supply of suitable material for commercial plantings.

Since the purpose of a mulch is to maintain a more or less permanent cover of the soil, it is obvious that one which is somewhat resistant to rapid decomposition has an advantage. Yet such a one contributes less nutrients to the soil than one which is relatively high in nitrogen and which decomposes rather quickly. Each type, then, has its advantages and we compromise between the two extremes.

A ligneous material like sawdust or wood shavings resists decay longest and will conserve moisture satisfactorily. Neither has particularly increased acidity of the soil nor resulted in any other disadvantage which we have noted. It takes a tremendous lot of sawdust to mulch a large tree. It requires a large amount of water to thoroughly wet it through, and any addition of nutrients from its decomposition is very slow. Yet both of these materials are used as well as small branches and other woody materials. It would be an advantage if they could be mixed with a portion of less ligneous vegetation such as straw, hay, weeds, alfalfa, etc. Then both advantages could be secured.

Some grasses are much more ligneous than others, such as

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straw, orchard grass, canary grass, sudan grass, and others. They well serve the objects sought.

Then there is the material which is high in cellulose which decomposes much quicker, such as clovers, alfalfa, blue grass, and soy bean hay. These materials will supply rather large quantities of nitrogen, potassium, some phosphorus, boron, calcium, magnesium and others. The greener they are when cut the more readily they decompose and the more nutrients they supply.

In a young orchard rye will produce a large quantity of mulch material and is often used provided the trees are well fertilized and the rye is not grown close to the tree. German or Golden millet is low in nitrogen and is a good mulch material. Timothy and clover mixture gives a good nitrogen balance. In general if the material contains more than two percent of nitrogen it will add this element to the soil and if less then that, it will utilize the nitrogen already present.

Ladino clover may be seeded in with a blue grass sod in August. The sod must first be disked. In many sections of the Central West blue grass eventually takes the land and legumes in the mixture tend to disappear.

Some special types of mulch that have limited use are seaweed, peat moss, and peat.

There are three common sources of mulch material: (1) It may be grown within the orchard; or (2) produced elsewhere for this purpose and hauled into the orchard; and (3) it may be purchased from an outside source.

One of the striking results secured by the Ohio Experiment Station in its early work in Southwestern Ohio was the effect of fertilizers on the increased growth of grass in the orchard, which provided a large supply of mulch material. The figures in the table show the results obtained in one orchard.

It was found that when superphosphate was used alone or in combination with potassium, a striking increase in growth of clovers resulted without any seeding. When nitrogen was used alone or in combination, the clovers were crowded out by timothy, blue grass, red top, and in some cases orchard grass, which took possession of the land.

These results are not obtained on all soils or under all climatic conditions. Neither phosphorus nor potassium may give measurable results on the ground cover with some soils but nitrogen usually results in a marked increase in the grass growth which can be used for mulch. The following results were obtained in one year on a rather infertile soil in central Ohio and are not exceptional.

YIELD OF GRASSES FROM NITROGEN FERTILIZATION IN AN ORCHARD OHIO, 1937

Plot	Treatment over Orchard	Yield of Dry Hay per Acre (lbs.)	Increase per Acre (lbs.)
1	Untreated	1,573	.....
2	200 lbs. Cyanamid	3,933	2,360
3	Same as Plot 2	4,689	3,116
4	Same as Plot 2	4,235	2,662
5	Same as Plot 2	4,311	2,738
6	400 lbs. Cyanamid	5,143	3,570

If part or all of the material is to be produced elsewhere than between the tree rows, it becomes an agronomic question as to what can be grown best and cheapest. It may require an acre of land or more to produce enough mulch for an acre of mature trees. Such crops as Siberian or German millet sown about June 1 and cut September 1, followed by rye and cut in the spring, should give about 4 to 5 tons of fresh material per acre on fertile land that is fertilized. Sudan grass and soybeans make a satisfactory combination in some regions and may yield 2½ tons per acre. Timothy top-dressed with about 300 pounds of sulphate of ammonia or Cyanamid may yield 1½ to 2 tons per acre. Other crops or combinations may be used as dictated by local conditions.

EFFECTS OF FERTILIZERS ON YIELD OF MULCH WITHIN THE ORCHARD (AFTER BALLOU)

Annual Fertilizer Treatment To an Acre	Yield (lbs.) Air Dry Hay	Type of Growth Predominating
Superphosphate 350 lbs.	2,716	Red Clover
Superphosphate 350 lbs., muriate of potash, 175 lbs.	2,884	Red Clover
Superphosphate 350 lbs., muriate of potash, 175 lbs., nitrate of soda, 350 lbs.	3,458	Timothy, red top, blue grass, orchard grass
Unfertilized	840	Poverty grass, weeds, briars

Mapping the Land According to Capability

Condensed from Soil Conservation

Dr. Firman E. Bear

Chairman, Soils Department, New Jersey Agricultural Experiment Station

THE Soil Conservation Service is now in the process of resurveying the soil resources of the Nation in terms of what is known as land capability.

The soil conservationist is concerned not only with the tremendous over-all problem of conserving our land resources but also with the very pressing problems presented by soil erosion on individual farms. In developing the conservation program it became apparent that the original soil surveys which had been made on a 1-inch-to-1-mile basis, were inadequate to meet the requirements. A more detailed map was needed that would show not only the distribution of all the important soil types, but would indicate the slope of the land and the kind and degree of erosion that were involved. Accordingly, a resurvey is now being made on a 4-inch-to-1-mile basis, which means multiplying the older map area 16 times.

Soon after this resurveying program got under way it became apparent that it provided an opportunity to break the generalized soil types down into smaller units that corresponded more nearly with the farmer's experience in dealing with the several parts of his individual fields. At first the tendency was to differentiate the soils into as many units as could be detected by field inspection, no matter how small the differences might be. Now, however, the survey is being based on only those factors that appear to be of considerable importance in differential practice. Even so, the resurvey is giving us from three to four times as many soil types as were mapped in the original survey. Furthermore, as would be expected with the passage of time and the gathering of more information about the soils of the several States, some of the original series names have had to be replaced with new ones that are more in conformity with usage in other areas.

The multiplication of the number of soil types presented com-

Reprinted from Soil Conservation, Washington, D. C., February, 1946

plications for men of limited memories, even when considered for a single county. But this was a relatively minor problem when compared with the one that developed when 6 classes of slope and 10 classes of erosion were introduced into the scheme. Thus the magnitude of the memory problem had been multiplied at least 200 times.

In order to overcome this difficulty it became necessary to group the various factors that determined the seriousness of the conservation problem into more practical units. Thus, two fundamentally different soil types, when considered in relation to their slope and erosion classes, often fell into the same conservation category. By continued study of this problem it became apparent that all soils could be grouped into a relatively small number of land-capability classes. The classes that were to be differentiated ranged from the most widely adaptable one, in which the land was so favorably situated and of such quality that practically no physical problem in land use by cultivation procedures was presented, to the worst one, in which the land was considered unsuited for anything except what a protected nature would provide.

In accordance with this concept, all land is now being placed in one of eight land-capability classes. Of these, seven classes fall into two major groups, the differentiation between them being made on the basis of their suitability for controlled cultivation. The division into classes within the group is based on the ease with which erosion can be controlled. Selecting the slope factor as an example, land in group A, classes I, II, III, and IV, would normally be described as flat, gently rolling, and hilly, respectively, and that in group B, classes VI, VII, and VIII, would be described as steep, mountainous, and cliffs (or swamps), respectively. Range land has been set apart from the others and designated as class V.

Once a farm is mapped in accordance with these land-capability classes, the farmer and his advisors are then in a position to plan a forward-looking program. In border-line cases, however, it may be necessary to go back to the field in order to determine the seriousness of the risk of endeavoring to utilize the land for a farming program that calls for more cultivation than is deemed advisable for that class of land. Thus, length of slope, roughness of topography, and exposure to wind are not shown on either the land-capability maps or on the soil survey maps which the land-capability colors overlie. The technical man, of course, can read a great deal more on these maps than the untrained.

In general, the greater the amounts of class I and class II land on a farm, the more intensive the farming enterprise may be, and the greater the permissible expenditure for machinery and labor. In proportion as more class III and class IV land is found on the farm, the more extensive the agricultural enterprise would normally be. In other words, land values and acre-incomes tend to drop and larger land areas are necessary for adequate labor incomes in the higher-numbered land-classes.

The mere fact that land is placed in one of the higher classes, however, does not mean that it is ruled out as to potentialities for profitable farming. In fact, the possibilities are quite the contrary for men of adaptability. An example of the realization of such possibilities is provided by a well-known New Jersey farmer who is now operating, in an adjoining State, some 2,000 acres of land belonging largely to classes IV, VI, and VII for raising heifers for dairy-herd replacement, for growing Christmas trees, and for the production of timber.

These three enterprises operate on three different time schedules, the heifers moving into milk production at about 27 months, the Christmas trees going to market on a 8- to 10-year schedule, and the timber requiring from 35 to 40 years.

Having purchased such a farm, the class IV and some of the class VI land is set aside for hay and pasture, and the remainder of the class VI and all of the class VII land is put into trees. The cost of producing Christmas trees on such land is estimated at $300 per acre, over a 10-year period, and the selling price of 2,000 trees per acre, out of 2,500 that were planted, at $1,000 per acre, at the end of a 10-year period, giving a net return of $700, or $70 per acre per year.

This discussion naturally leads to a consideration of two very important points, one having to do with the uses to which land-capability maps can be put, and the other with the problem of education of the public toward improved use of land.

Considering first the possible uses of land-capability maps, it is readily apparent that they have great value both to the farmer and to those who advise him. But it is well to keep in mind that they will ultimately be widely used in farm real-estate transactions as the basis for evaluating the potentialities of the land for the purposes the new owner has in mind. Thus the first thing any man who wants to buy a farm should do is to go to the soil conservationist's or county agent's office and examine the land-capability map of the farm. But land-capability maps will also find highly impor-

tant uses in evaluating land for taxation, for credit purposes, in condemnation proceedings, when damages are incurred as a result of highway construction or other public improvements, and for a great variety of other purposes.

The second problem, that of educating the public to the end that profitable use is made of all land, is of even greater importance. Thus we need not only to conserve properly the better cropland, but also to open up the minds of men to the long-range potentialities of land for forest, recreational, and game purposes, all of which enterprises can be made to stand on their own feet. It is my considered opinion, growing out of a careful study of what the Soil Conservation Service is doing in the way of mapping land as to its use-capabilities, that this is one of the most far-reaching enterprises in its potentialities for public good that has ever been undertaken in this country.

B Vitamins from Cow Manure

Condensed from The Country Guide

BEFORE farmers learned there was such a thing as vitamins and balanced rations, it used to be regarded as a natural combination for hogs to follow the cattle in the barnyard and salvage the waste grain, and for hens to follow the hogs. Since then the wheel of progress has turned almost an entirely full circle, as the result of careful experimental tests. We learned about balanced rations, and how the balance between carbohydrates and proteins required by different animals might vary and how different combinations of grain produce different results. We have learned that hogs might be kept indoors entirely and fed to desirable weights in quick time, and about the need for vitamins as well as about the ability of hogs and other animals when self-fed to choose intelligently the combination of grain or chop and minerals which balance their ration.

Now comes the report of an experiment conducted in Wisconsin, where several groups of pigs fed vitamins in different ways, proved that the fastest average daily gains were made on a ration containing five percent alfalfa meal plus cow manure. This wartime investigation was based on a desire to find a hog ration sufficiently high in B vitamins under conditions where soybean oil meal was the only protein supplement provided in a ration consisting largely of yellow corn. Five percent alfalfa meal, some ground limestone and iodized salt, still produced a ration low in B vitamins. It was known that growing pigs could do well if the ground alfalfa were increased to 15 percent, and produced gains that were very economical.

Due presumably to the high B vitamin content of cow manure, the experiment which included 22 pigs in each of five lots, showed that five percent of ground alfalfa, plus cow manure, was equal to a ration containing 15 percent ground alfalfa without the cow manure.

In another Wisconsin experiment four ounces of irradiated yeast were used in each ton of feed, in order to supply vitamin B during the winter months. The pigs in the lot which received not only irradiated yeast, but had access to cow manure as well, outdistanced all others, making an average daily gain of 1.51 pounds

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per head, and required only 375 pounds of feed to produce 100 pounds of gain.

Where the irradiated yeast was used as the only vitamin supplement, slightly faster and more economical gains were made than where cow manure was the only supplement. This seems to indicate that pigs may have even greater need for vitamin B in winter than for vitamin D. It is reported that only a limited amount of work has been done with these supplements and that the results are therefore not conclusive. Moreover, irradiated yeast is reported as rather high priced, but nevertheless very economical, since so little is required to mix with a ton of feed.

Use Rotenone for Grubs

Condensed from The Dakota Farmer

Dr. F. Gray Butcher

KILLING the large cattle grubs in cows' backs with some form of rotenone dust is a practical method of control of the pest that causes higher losses of milk, meat, and hides each year than any other insect pest of livestock. Treatment is done after the grubs cut holes in the cow's hide and before they drop to the ground, as this is the weakest point in their life cycle.

Cattle grubs are the young of the heel fly, a large bee-like fly that neither bites nor stings. Cattle are mortally afraid of heel flys, however. In summer when the flies are about, cattle will spend a large part of their time running from the flies or standing in water in an attempt to avoid them. The stock thus loses flesh and goes down in production at a time when pastures are best and the animals should be gaining.

Heel flies lay large eggs on cattle in spring and early summer. The flies glue the eggs to hairs, usually on the legs. These eggs hatch in three or four days, and the tiny grubs burrow directly through the skin, migrate upward through the body, muscle tissue, and finally appear in cysts, or bumps on the cow's back about nine months after hatching.

Soon after appearing in the back, each grub cuts a hole through the hide. About a month later it drops to the ground, goes through a resting stage, and in three to seven weeks emerges as an adult fly to start the cycle over again.

To control grubs, the first treatment should be one month after the first bumps appear on the cow's back, following with another treatment 30 days later.

Apply rotenone dust with a shaker top can or jar, working it into the hair by rubbing vigorously with the free hand.

In 1944, a group of McKenzie County ranchers organized a successful community grub-control program, applying the rotenone dust to some 2,000 head of cattle. The first treatment was given the first week in March and the second the first of April. Since then other communities have conducted successful programs of treatment to rid their cattle of the pests. Over 35,000 head were treated in the state in 1945.

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These books are recommended as outstanding in their field:

A Living from Bees—By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. $2.25.

America's Garden Book—By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons. $3.50.

An Agricultural Testament—By Sir Albert Howard, C.I.E., M.A., former Director, Institute of Plant Industry, Indore. Oxford Univ. Press. $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean, School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers. $2.00.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State College. College Book Co. $3.75.

Dairy Cattle Feeding and Management—3rd Edition—By H. O. Henderson, Prof. of Dairy Husbandry, W. Va. Univ., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.00.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. Dairy Husbandry, Univ. of Minn. By R. W. Gregory. J. B. Lippincott Co. $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D. V. M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition. $3.75.

Farmers of the World—The Development of Agri. Extension—edited by Edmund deS. Brunner, I. T. Sanders, Douglas Ensminger. Columbia Univ. Press (1945). $2.50.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. $3.00.

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Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief, Div. of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook — By Julius E. Norby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The interstate Printers. $2.60.

Modern Agricultural Mathematics—By Maurice Nadler, B. S., A. M., Dept. of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., formerly U. S. Dept. of Agri. Orange Judd Pub. Co., Inc. $4.50.

Natural Principles of Land Use—By Edw. H. Graham, Chief of Biology Div., Soil Conservation Service. Oxford University Press. $3.50.

Pay Dirt—Farming and Gardening with Composts — By J. I. Rodale. Devin-Adair Co. (1945). $3.00.

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Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry. Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. Rural Education, Atlanta Univ. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping—By H. Clyde Knandel, Head, Dept. Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Pork Production — By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue Univ. The Interstate Printers & Publishers. $1.80.

Seaman A. Knapp—Schoolmaster of American Agriculture—By Joseph C. Bailey, Dept. History and Social Science, Hunter College. Columbia University Press. 1945. $3.25.

The American Land — Its History and Its Uses — By William R. Van Dersal, biologist in the U. S. D. A. Oxford University Press. $3.75.

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